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CATALOG  
OF  
STEREOPTICONS  
MOTION PICTURE MACHINES  
PROJECTION APPARATUS

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THIRTY-NINTH EDITION

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Manufactured and Imported by the

**McINTOSH**  
STEREOPTICON COMPANY

CHICAGO, ILL., U. S. A.

### TERMS.

The prices quoted in this catalog are f. o. b. Chicago, Illinois.

Satisfactory references are required where goods are ordered on open account; otherwise remittance in cash, postal or express orders, or New York or Chicago draft should accompany the order.

If goods are to be shipped C. O. D., 25 per cent of the amount of the order is required to accompany it.

Unless specially arranged, all accounts are payable on the 10th of the month following the date of purchase.

### SHIPPING.

Unless otherwise specified, all goods will be sent by express, except on very large orders. Goods shipped by parcel post are sent at the customer's risk of non-delivery, loss or breakage, except:

We carry a special insurance policy covering the safe delivery of goods shipped by parcel post, under the terms of which our customers, by a small additional payment, may be protected against any loss.

For a payment of 2½ cents, a shipment can be insured to the value of \$10.00.

For 5 cents, a shipment up to the value of \$25.00.

For 7½ cents, a shipment up to the value of \$35.00.

For 10 cents, a shipment up to the value of \$50.00.

### PACKING.

We make no charge for boxing or crating goods for shipment by freight or express, although we take the greatest care in packing.

### APPROVAL.

If it is decided not to retain goods sent on approval, they must be returned promptly at the expiration of the approval period. Transportation on such goods is at the expense of the customer. If goods are returned in a damaged condition, they will be repaired at the customer's expense. Never return goods to us, for any reason, without notifying us of the shipment and giving us the date of the invoice covering the returned goods, also mentioning by whom they were purchased and the invoice number. Use the same care in packing goods for return as we do in shipping them to you. In sending goods to us for any purpose, mark them with a tag, bearing plainly your name and address.

## HOW TO ORDER GOODS.

In ordering goods by mail, be sure to specify the full name of the article just as it appears in our catalog, as well as the page number and the edition of the catalog. It is best in ordering several articles to list or tabulate them.

With a complete stereopticon outfit be sure to specify just which objective is wanted, ordering it by its name (see page 77), and also which illuminant is desired. If electricity is to be used, be careful to specify the voltage, and whether the current is direct or alternating.)

It is safest to be explicit in giving shipping directions, stating plainly whether an article is to be shipped by mail, express or freight, and, wherever possible, specify the express company or railroad by which it is to be shipped.

Be sure to write your name and the address to which you wish shipment made, very plainly. A great deal of trouble frequently arises from not giving specific enough directions, and from not writing legibly.

State the date on which you desire shipment made and, if possible, we will comply with your request but assume no responsibility for prompt deliveries.

Always allow plenty of time for your order to reach us before the day shipment is to be made, and bear in mind that altho we will give you the most prompt and courteous service in our power, still it frequently takes some time to fill an order after it is received.

## OUR GUARANTEE.

Our goods are all made of first-class material, highly finished, are of the most approved and up-to-date design, and are optically and mechanically correct. They are carefully inspected and thoroly tested, and we absolutely guarantee them against any imperfection of material or construction, and should any such defect appear and be in any way our fault, we will cheerfully make good either by repairing or replacing the defective part, free of charge.

## ERRORS.

We make them—who does not? But we will cheerfully correct them if the fault is ours. Try to write to us good naturedly, but if you cannot, write us anyway, rather than complain to your neighbors and friends. We are anxious at the earliest possible moment to correct any mistakes which may have occurred. Do not let any mistake pass unnoticed.

We thank our friends for their past favors and trust that we may receive their further valued patronage.

## FOREWORD.

In presenting to the public our Thirty-ninth Edition Catalog, we feel that it is not amiss for us to say a little bit about the McIntosh Stereopticon Company, its high standing in the field of optical projection, its experience and its policy.

Established nearly forty years ago, the McIntosh Stereopticon Company has grown a little every day and its policy of "square deal" principles, giving its customers full value for every dollar they invest, producing the highest quality goods it is possible to turn out, making its prices as reasonable as possible, and offering the most prompt and courteous service in every particular is, in a large degree, responsible for its success.

The McIntosh Stereopticon Company wants to serve the public to the very best of its ability. For that reason it does not limit itself to goods of its own manufacture, but presents the best that the market affords, whether it is made by a competitor or not.

The McIntosh Company has always been a leader in the production of optical projection instruments and makes a point of offering its customers the very latest improvements in its line.

It wants, and feels that it has in a large measure, the co-operation of its customers. There must, of course, be such co-operation if there is to be mutual satisfaction.

Any suggestions of customers, for the improvement of the McIntosh line, will be carefully considered and given the attention they deserve. On the other hand, the company wants its customers to ask any questions they may see fit and otherwise to make use of McIntosh Service.

## INTRODUCTION.

It is now a generally recognized fact that 87 per cent of all the knowledge of the average human being comes thru the medium of his eyesight.

There are two reasons for this: first, the fact that the eyes are, of all the senses, by far the keenest perceivers; and second, the fact that, of all things created, more are capable of being perceived by the sense of sight than in any other way. Eighty-seven per cent is an overwhelming proportion, but such it is generally conceded to be. This fact is recognized to such an extent that State Departments of Education are taking cognizance of it and several have already established bureaus or divisions of Visual Instruction. These divisions have large collections of slides that they offer free to the different schools of the state, upon which they urge the purchase of suitable projection lanterns.

Schools and colleges all over the world are taking up the use of the projection lantern in its various forms, more and more extensively all the time, realizing that pictorial demonstration is second only to actual experience. Many of them own their own collections of slides. Others make use of the slides furnished by the Departments of State Education, and by the extension divisions of their State Universities. Many find the large stock of slides listed in our catalogs and those of others, of great assistance to them; by means of a rental plan, they are not required to purchase the slides outright, but can use them at a remarkably low cost.

Microscopists find frequent use for the stereopticon provided with microscope attachment, as it enables them to study many processes on a large field, giving the relation of parts, and economizes time, aside from the convenience of being able to demonstrate to all observers the work done.

Secret societies find that the interest taken in their initiatory ceremonies is greatly increased by the use of the stereopticon. The instrument is also of great help in making up programs for "open night" entertainments and can easily be made to pay for itself in this use.

Churches are using projection lanterns more and more extensively, in their regular services and for mid-week enter-

tainments. The pastor can, with only a small amount of preparation, take his congregation anywhere in the world, show them the way other people live, explain various industrial processes, assist, in rural communities, in agricultural extension and home economics, or get up entertainments of just pure fun. A moderate admission fee or a silver offering at these entertainments frequently is used as a means of obtaining funds for improvements which would otherwise be impossible.

In the Sunday school the stereopticon is used to help in studying the lessons. Sets of slides are arranged to illustrate the International Lessons and many other subjects which can be properly taught in the Sunday school.

Y. M. C. A.'s all over the country are fast coming to realize that the stereopticon is an almost indispensable adjunct to their work. It is used a great deal in their large lecture rooms for entertainment purposes and is found to be a great help in the class room work of their night schools.

Insane asylums and other public institutions, where those mentally or physically enfeebled are cared for, find the stereopticon an endless source of interest and benefit to the patients; the minds of the patients can be directed to any subject thought desirable by properly selected pictures.

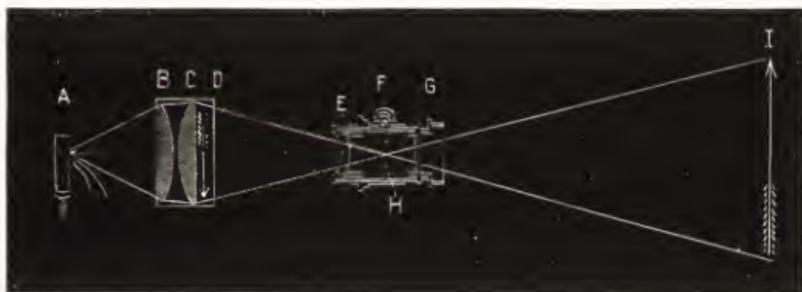
Home Entertainment. Projection lanterns afford a never-failing source of amusement in the family. Many people who have become expert in amateur photography entertain their friends at home with the products of their "summer outing" in the form of views, which they have taken, of the objects and places of interest discovered in their trips. These can be so readily transformed into beautiful lantern transparencies that this art has become a fascinating recreation to those willing to take the trouble to acquire the simple but necessary details of the process.

Opaque projection makes it possible also to use ordinary paper prints, half-tones clipped from a newspaper or book; in fact, practically anything which is not transparent. And this feature opens up a hitherto unthought of field for home entertainment.

In fact, there is hardly any field of instruction, entertainment or visual interest, wherein pictorial demonstration plays a part, which is not advanced and benefited by the use of optical projecting lanterns.

## OPTICAL PROJECTION.

The widespread use of optical projecting instruments makes it advisable to here present, in a general way and in as simple terms as possible, some information along the scientific and optical side of projecting lanterns.



In the above diagram we show the essential parts of any projecting lantern. "A" represents the light (which in this particular case is limelight); "B"- "C," the condensing lenses, or "condensers," and "E"- "G," the projecting lenses, which, together with the entire mounting form the "objective." The remaining part of the lantern, the frame or body, is simply to hold the slide and these three parts in proper position, and render the light and lenses effective. The light from "A" radiates in all directions, altho from lime and electric arc light the radiation is principally toward the lenses. As much of it as strikes the condensing lens, "B," is refracted and passed thru the second lens, "C"; thence thru the transparent slide, which must be inverted, represented by the arrow "D," and brought to a focus between the two combinations of lenses, "E" and "G," of the objective, from which point it diverges in a cone-shape to the screen, where the image, "I," is formed right side up. The function of the condensing lenses is to collect and condense, or focus, the light, which passes through the glass slide into the objective, the office of which is to magnify the slide, or picture, and form an image of it on the screen. The distance the objective is placed from the slide depends upon its focal length and the distance the lantern is used from the screen. The longer its focus and the shorter the range from the screen, the farther from the slide it must be used and the closer, within certain limits, the light must be placed to the condensing lenses.

By moving the light closer to the lens, "B," it will converge to a point further from the front lens, "C," which will be the proper position if a long-focus objective is used. By drawing the light back from the lens, "B," it is converged at a point nearer the front lens, "C," which is the proper position if a short-focus objective is used. In either case the focal point

should meet the objective at the diaphragm, marked "H" in the cut.

The illuminant or light is the most important part of any projecting lantern. We have heard people say, "It's all in the lens." We have seen that so often in advertisements of cameras and camera lenses that one might think it true.

Lenses, of course, are exceedingly important, but not nearly so important as a good, powerful, concentrated light. A very cheap lens, with a good light, will sometimes make a very good picture, whereas the most expensive lens, with a poor light, is not satisfactory for projection.

### LIGHT.

Two things are essential for a good projection illuminant. One is a powerful illumination; the other, a very concentrated source of light. With these two points in mind, we find that the electric arc lamp is the best of all illuminants. The arc of electric current, jumping across the gap between the ends of the two carbons, heats them to a state of white-hot incandescence, so that they give out light, most of it being derived from the so-called crater of the carbon, which is a very small point.

For projection purposes, candle power claims really mean nothing. They are simply comparative, candle power being measured at the screen.

We have assumed, as a basis, that the electric arc lamp produces 1,000 candle power for every five amperes of current consumed, and on that basis we rate all our illuminants.

With an electric arc lamp it is possible to use all the way from 5 to 60 or 70 amperes of current, getting approximately a thousand candle power for every 5 amperes. For general, all around work there is no illuminant which compares with the electric arc lamp.

Only recently, however, the Nitrogen-Mazda incandescent lamp has been placed on the market. This lamp is furnished in two different sizes, both of which are well adapted to projection purposes. One is the 250-watt lamp and the other is the 500-watt lamp. The 250-watt lamp, with a silvered back or used with a reflector, produces about 1,200 candle power. The 500-watt lamp produces about 1,600 candle power.

These lamps and the low current consuming arc lamp, can be attached, with perfect safety, to the ordinary incandescent socket and will project good pictures up to a distance of about forty feet from the screen, or perhaps a little more, making a picture up to about ten feet square. For use at a greater distance from the screen than about forty feet we recommend that the arc lamp be used exclusively, using 15 amperes, or perhaps more, and requiring special wiring.

Where electricity is not available, calcium light is the best

illuminant. Calcium light is otherwise known as oxy-hydrogen and lime light.

Calcium light is produced by projecting a jet of mixed oxygen and hydrogen against a piece of lime, especially selected and prepared. The burning mixed gases heat a portion of the lime to a state of incandescence, which produces a very brilliant light, second only in candle power to the electric arc lamp.

Calcium light is often unsatisfactory, however, because you must carry about large, heavy tanks full of oxygen and hydrogen, or have a gas making outfit, by means of which you can generate your own oxygen, using mixed ether and oxygen as a substitute for hydrogen.

With a four-jet acetylene burner, backed by a good mirror and using proper lenses, a good picture can be made up to about 9 feet square at a distance of 30 feet from the screen.

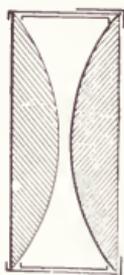
For use in a permanent location, acetylene is used either by a generator or from a Prest-o-Lite tank. In either case it is entirely automatic, burns with a good, steady flame, and requires no attention in operation. A Prest-o-Lite tank is more convenient than a generator, which must be charged each time before using and should be cleaned out each time after using, but it is also somewhat more expensive in operation. For the use of anyone who is delivering his lectures and making a demonstration in different locations, arrangements can be made, perhaps, with the local automobile garage at each place or with some automobile owner, for the use of a Prest-o-Lite tank. If not, a generator must be carried along if acetylene is to be the illuminant.

Many people who are traveling about from place to place where electricity is not available and calcium light seems impracticable, prefer Alco-lite to acetylene, because of its greater compactness and portability.

Alco-lite is produced by burning vaporized or gaseous alcohol on an incandescent mantle of the regular Welsbach mantle type. It has some advantages over acetylene and some disadvantages. It is exceedingly compact and portable, pleasant and clean to work with, and as an initial investment is quite a bit less than the acetylene equipment. It produces about the same illumination of the picture as acetylene. It is not, however, entirely automatic, requiring some little attention in operation and, like any gas burned under pressure, it operates with a slight hissing noise, which is sometimes considered an objection to it. This, however, is more than overcome in the majority of cases by the fact of its being so portable and convenient.

There are other illuminants, but they are all of much lower power and for other reasons are not altogether satisfactory; and so we will not consider them here.

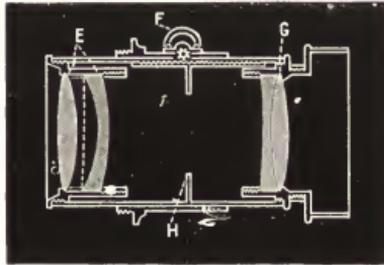
## THE CONDENSERS.



CONDENSING lenses are usually made of crown glass of greenish color; flint glass condensers would be preferable where the greatest perfection is required, as they would be more colorless, but, on the other hand, be very expensive. Many suppose that a lens having fine bubbles through it should be condemned as imperfect, but unless the bubbles are close to the plano side of the front condenser and large enough to show a dark spot on the screen when picture is in focus, they do no harm, as their only effect is to imperceptibly cut down the illumination. Theoretically, any angle of light may be taken up by the condensers and a large condensing lens would be the best to use, but, practically, it is limited to an angle between 65 and 70 degrees, and any light beyond that angle is lost by reflection from the surface of the lens, owing to the high angle of incidence, and the edge of the picture would be less illuminated than the center. In the case of two condensing lenses of different focal lengths being used in the lens cell, the thinnest, or one of longest focus, should be nearest the slide.

Many forms and sizes of condensing lenses have been tried in the Optical Lantern, but most authorities agree that two plano-convex lenses,  $4\frac{1}{2}$  inches in diameter, mounted with their convex sides nearly touching, is the best form for artificial light when everything is considered. In the use of condensing lenses for projecting negatives for photo-enlargement, or transparencies in regular lantern work, the lenses should be a little larger in diameter than the diagonal measurement of the negative or slide, to obtain the best results. Light rays from the sun are parallel, and not divergent, as with artificial light, hence it is necessary to use but one condensing lens, with the convex side next the light, and with a slide placed close to it, to obtain full illumination.

## THE OBJECTIVE.



**I**N HIGH-CLASS Lanterns the simple plano, or double-convex lens is replaced by the double achromatic objective, which is made up of four lenses, or two combinations. The lens used nearest the light is a crown-glass, double convex lens, of unequal curvature, known as a "crossed" lens, and is placed in the cell with the greatest curvature towards the front. Next in order is a flint, concavo-convex lens, with convex side also toward the front. The two lenses are held apart by a thin brass ring, and secured in a cell by a threaded ring. This cell, with the two lenses, is known as the back combination, "E," and screws into the rear of the objective mounting. The front combination, "G," when removed from the cell, appears like a single lens, but is, in reality, composed of two lenses, a flint plano-concave lens, cemented with transparent balsam to a crown glass double convex lens with convex side used towards the front. This front combination is screwed into the front of the objective mounting. The brass plate, "H," with circular opening in the center, is known as the "diaphragm," and is to prevent marginal rays of light from coming to a focus at a different point from those rays nearer the center of the lenses. The long brass tube with lenses attached telescopes into a jacket, in which it is made to move freely back and forth, by a rack and pinion (marked "F" in the cut) for convenience in focusing. The size of the projected picture depends upon the focal length of the objective, irrespective of its size, and the distance it is used from the screen. The shorter the focus the larger the picture, at the same distance from the screen. Almost any size picture can be made with any objective by using it at different distances from the screen, but with the complete objective but one size image can be made at a certain distance. By removing the rear combination and using the objective with front combination only we increase its focal length and can make a smaller picture at the same range as when complete. The picture, however, is not quite as perfect but is very good and the expedient is very convenient at times. As a rule, the smaller the lens the more powerful or shorter the focus it has. A large lens is not a powerful one, as far as magnification is concerned, as many suppose.

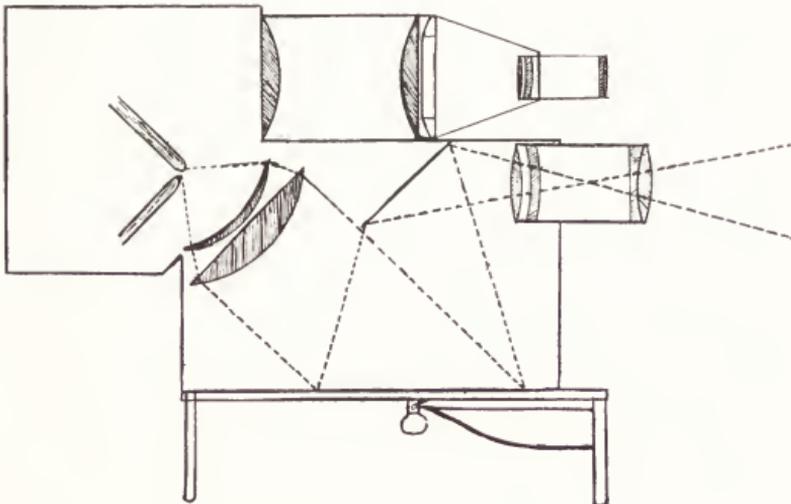
## OPAQUE PROJECTION.

It is frequently desirable to have an instrument which will project post-cards, photographs, and other opaque specimens and natural objects. This is accomplished by means of reflected light. There is, of course, quite a considerable loss of light in the reflection and for this reason it is essential to have as powerful a light as possible, concentrated on the opaque object.

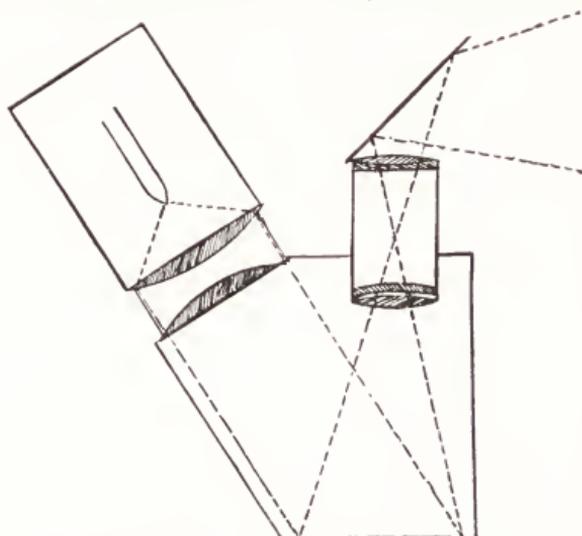
Here, again, the arc lamp is the best illuminant and should be used where possible with at least 25 amperes of current.

The illumination from the lamp is concentrated by means of condensing lenses on the opaque object, as shown in the diagram. From the opaque object it is reflected through the objective lens to the screen, suffering a transposition and inversion as it is projected. For this reason it is necessary to insert the opaque object upside down, as it is in the case of the slide, and if it is essential that the objects show properly from left to right in the image which is projected on the screen, a transposing mirror must be inserted. This may be inserted between the opaque object and the objective lens, as in the case of the Multiopticon, or between the objective lens and the screen. The use of this mirror slightly reduces the brilliancy of illumination.

With either type a good picture can be projected up to about nine feet square, at a distance of not more than about thirty feet from the screen.



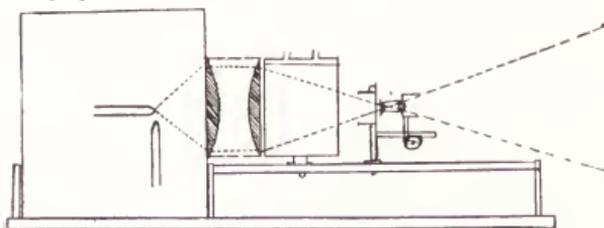
Path of Light in Opaque Projection with the Multiopticon.



Path of Light in Ordinary Opaque Projection.

Opaque projection cannot be satisfactorily accomplished with anything except the electric arc light, or the nitrogen-filled incandescent, and in the case of the latter the distance and size of picture must be very limited.

With a simple projecting microscope, the path of light is very similar to that of regular lantern slide projection, except that instead of going thru the projecting objective used for lantern slides it goes thru a microscope objective, after first passing thru the slide of the regular microscope type and size, mounted on a regular microscope stage, fine adjustment or perfectly plain.



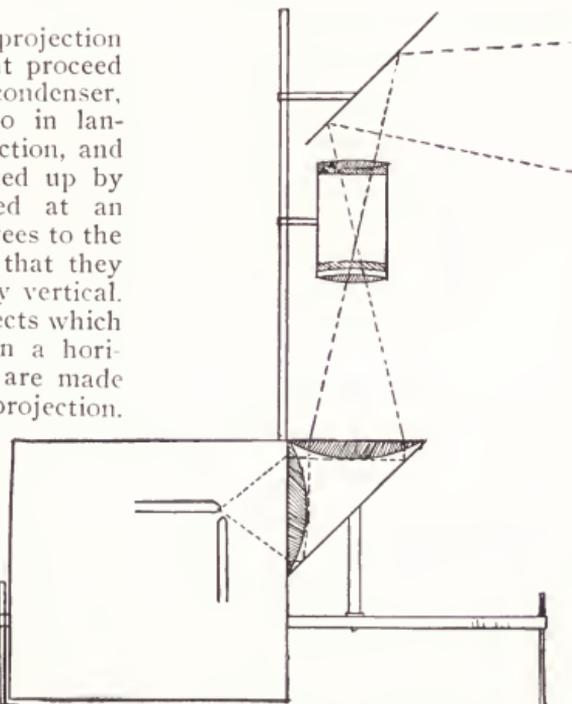
Path of Light in Simple Projecting Microscope.

Any projecting microscope will take standard objectives and will work very well with an objective up to one-sixth.

The concentration of the rays of light on the small microscope slide and objective is such as to intensely heat them. Therefore it is essential to pass the rays through a cooling tank, or water cell, before they reach the microscope slide and after they leave the condensing lenses. This water cell and a simple projecting microscope are illustrated.

In vertical projection the rays of light proceed thru the first condenser, just as they do in lantern slide projection, and are then reflected up by a mirror placed at an angle of 45 degrees to the optical axis, so that they become perfectly vertical.

In this way objects which must be held in a horizontal position are made possible of projection. For instance, magnetic lines of force, the action of oil, etc., on the surface of water, Chladni's figures, crystallization, sound waves, etc. The light having passed



Path of Light in Vertical Projection

in a vertical direction thru these various objects, or ordinary lantern slides if desired, then proceeds thru the objective, the axis of which is in a vertical position, and is reflected again from a mirror, placed at an angle of 45 degrees to the axis, forward in a horizontal direction toward the screen.

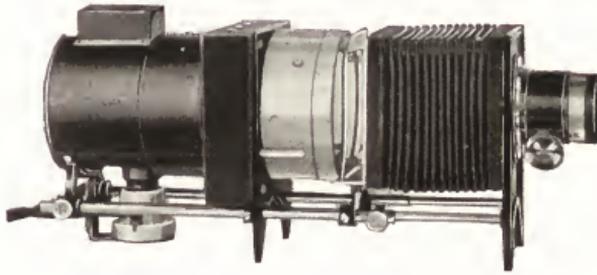
There are other forms of projection such as spectroscopic, polariscopic and motion picture projection, but the foregoing are the common forms and we will not here dwell on the others. Special information about them will be gladly given to anyone who will write for it.

The stereopticons and projection lanterns which appear on the following pages represent, we believe, the best that the market affords. Here are lanterns ranging in price from \$20.00 up; exceedingly simple, inexpensive projectors, and the finest high grade, scientific and laboratory outfits. Every one offered is the very highest grade. Every one is an honest dollar-for-dollar value and every one is backed by the McIntosh guarantee.

You can make no mistake in writing to us for prices and information and in placing your orders with us for projection apparatus.

McINTOSH STEREOPTICON COMPANY.

## TRIUMPH SCIOPTICON.



PRICE, as illustrated, with 250-watt silvered back, nitrogen filled Mazda lamp, slide carrier, 6, 8, 10 or 12 inch focus objective, in $1\frac{5}{8}$ " diameter mount.....	\$22.00
PRICE, with friction feed carbon arc lamp, 5 ampere 110 volt, rheostat, objective and slide carrier.....	20.00
PRICE, with double jet acetylene burner, objective and slide carrier .....	20.00
PRICE with both arc lamp and acetylene burner.....	25.00
PRICE, canvas covered, copper fastened, leather handle case...	1.50

The Triumph Sciopticon is exceedingly small and compact (closed, 14"x8"x5"). It is also very light in weight and easily portable. (Weight complete with incandescent lamp,  $8\frac{3}{4}$  lbs.)

This lantern might almost be called "self operating." The lamp is permanently centered, except for an adjustment along the optical axis of the lantern which is necessary in using it at different distances from the screen. With the incandescent lamp or acetylene burner, no attention is required after the lantern is started and adjusted, except to change the slides. With the arc lamp, of course, it is necessary to feed the carbons from time to time as they are consumed, but this is very simple and easily accomplished.

The Triumph Sciopticon is built thruout of the very best material. It is carefully constructed, scientifically and optically perfect and using the incandescent lamp or the arc lamp will project a good 10-foot picture up to a distance of about 40 feet from the screen.

In either case it is possible to attach it to the ordinary incandescent socket, so that special wiring is not required.

Its extreme simplicity and convenience of operation as well as the low current which it consumes make it an ideal instrument for small class rooms, Sunday schools or halls not over 50 feet in length.

## THE MONITOR SCIOPTICON.



PRICE, with 90 degree hand-feed arc lamp, 6, 8, 10 or 12 inch focus objective in $1\frac{5}{8}$ " diameter mount, slide carrier and case.....	\$25.00
PRICE, the same as above, but with $2\frac{7}{8}$ " diameter objective.....	30.00
PRICE, with 250-watt nitrogen filled Mazda lamp with silvered back, $1\frac{5}{8}$ " diameter objective slide carrier and case.....	31.50
PRICE, same as above, but with $2\frac{7}{8}$ " diameter objective.....	37.50
PRICE, with quadruple jet acetylene burner, $1\frac{5}{8}$ " diameter objective .....	28.50
PRICE, same as above but with $2\frac{7}{8}$ " diameter objective.....	34.50
PRICE, with alco-lite illuminant and short light shield.....	30.00
PRICE, same as above, but with $2\frac{7}{8}$ " diameter objective.....	38.50
PRICE, Monitor Sciopticon with calcium light jet.....	32.50

In the Monitor Sciopticon we offer, at a remarkably low price, a thoroughly efficient, first-class instrument for lantern slide projection, capable of being adapted to opaque, vertical and microscope projection, by the addition of the necessary accessory apparatus.

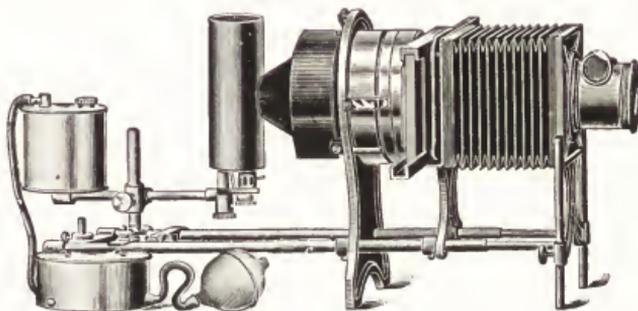
If it is originally the intention to buy a lantern for these other forms of work, perhaps one of the other types of instruments, such as the College Bench, would be better suited, but while the Monitor is designed especially as a lantern slide projector, should you buy one and later on want to add these other forms of projection, it can be done without difficulty and at exceedingly reasonable prices.

The design and construction of the Monitor is such that all the optical parts are supported upon the telescoping bench rods, which in turn are supported by a central casting upon which the lantern fulcrums as on a pivot for adjustment at different angles of elevation and by adjustable legs at the front and back of the bench rods. The lamp house and condenser cell are mounted on the central plate casting; the slide stage, upon the bench rods; the objective, on the front casting, which is, in turn, supported by the bench rods; and the illuminant, upon the bench rods inside the lamp house.

The equipment of the Monitor is standard in every particular; every detail is carefully worked out; it is exceedingly efficient, guaranteed as to material and construction, durable, simple and easy to operate, and last, but by no means least, exceedingly inexpensive.

Any illuminant can be used with the Monitor Siopticon and any objective can be fitted to it. Everything about it is standard and it is our honest belief that the Monitor Siopticon is, "dollar for dollar," the biggest value on the projection market.

The Monitor Siopticon can be equipped with any of the different illuminants or objectives listed in the catalog; equipped with the "H-8" or "H-10" objective it will be found practicable to use it up to a distance of 30 feet from the screen and it will produce a bright, clear picture with the Alco-lite illuminant.



Monitor with Alco-lite illuminant.

### CARBONS.

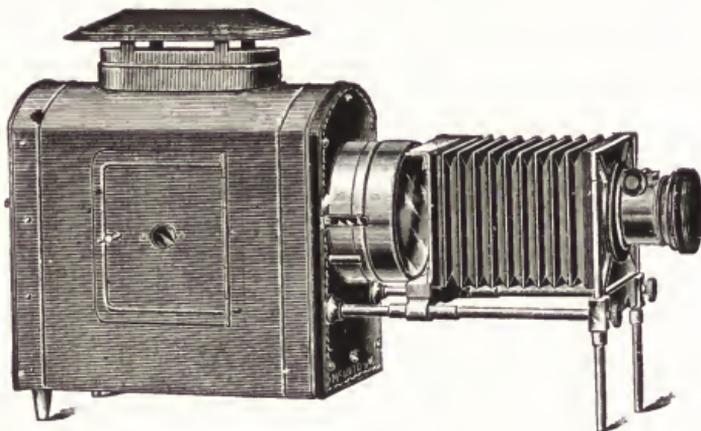
After years of experiment, we have found that the imported Electra Nuernberg carbons are the most satisfactory for use in a projection lantern. They are freer from impurities, and of a finer quality of carbon, so that they burn with less sputtering and fuss.

On direct current the positive pole may easily be determined by striking the arc and allowing the lamp to burn for about a minute; then switching off the current and quickly glancing at the hot ends of the carbons. The hotter of the two is the positive carbon and should be the upper carbon.

PRICES:—

1/4-inch soft cored carbons, each, net.....	4c
3/8-inch soft cored carbons, each, net.....	4c
3/8-inch solid carbons, each, net.....	4c
1/2-inch soft cored carbons, each, net.....	4c
5/8-inch soft cored carbons, each, net.....	4c

## THE McINTOSH SCIOPTICON.



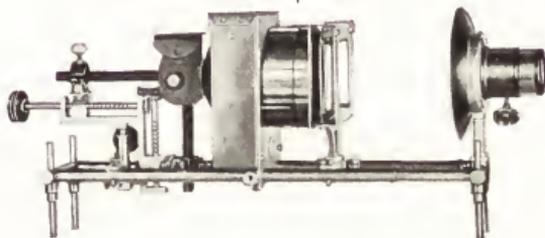
PRICE, with choice of either 6, 8, 10 or 12-inch focus objective in $\frac{1}{4}$ mount, slide carrier and carrying case, without illuminant. ....	\$25.00
“ with heavy protected body, choice of objectives above and 90° Hand-Feed Arc Lamp, but without rheostat or case, designed to pass Chicago electrical requirements .....	36.50

## Illuminants.

PRICE, Arc Lamp, either Upright or 90° and No. 1 Rheostat ....	14.00
“ Oxy-hydrogen Jet, No. 3 .....	10.00
“ Alco-lite, complete .....	10.00
“ Nernst Lamp .....	10.00
“ Quadruple Acetylene Jet, and support, without generator .....	6.00
“ Incandescent Electric Lamp, with flexible wire, 250 W..	7.50
“ Incandescent Electric Lamp, with flexible wire, 500 W..	9.00

Any of the seven different illuminants listed above can be used interchangeably in this lantern. A large body completely surrounding the illuminant has the advantage of preventing almost entirely the escape of light, and when used with the electric arc lamp permits of the use of a heavy current without overheating. The condensing lenses are mounted in the simple box form which after long use has proved itself so satisfactory. The front plate holding the objective is of aluminum and is threaded for a half size lens. The lantern can be conveniently tilted upward by raising the front on the leg rods and securing by means of the clamping screws. The steel slide stage (like the one used on the Monitor Sciopticon) is constructed so that slides may be entered from the top or side and will accommodate any thickness of slide or carrier. The bellows has a draw of thirteen inches.

## PORTABLE SCIOPTICON.



PRICE,	with choice of either 6, 8, 10 or 12-inch focus objective in $\frac{1}{4}$ mount, slide carrier and carrying case, without illuminant .....	\$30.00
"	with Upright or 90° Arc Lamp and No. 1 Rheostat .....	45.00
"	with Collapsible Body and No. 3 Calcium Light Jet .....	44.00
"	with Alco lite Outfit. ....	40.00
"	with Nernst Lamp .....	40.00
"	with large protect-d body, choice of objectives above and 90° Arc Lamp but without rheostat or case, designed to pass Chicago electrical requirements. ....	45.00
"	Set of Parts to Connect Portable Sciopticon to College Bench Lantern .....	5.00

The Portable Sciopticon was designed to meet the demand of our customers for a first-class single lantern made in the most compact and lightest form possible for convenience in carrying about from place to place.

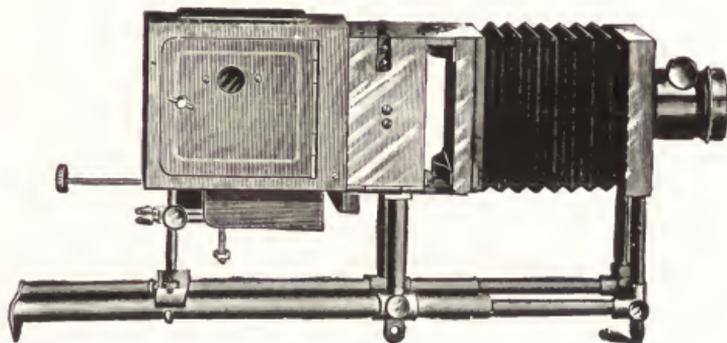
The frame is made up of four sections of telescoping brass tubing. The two outside tubes are joined and held parallel by a brass casting at the back forming a frame or bench, upon which are slipped two aluminum "Y" bridge pieces, (same as used on our College Bench Lantern) which support respectively the illuminant, and steel slide stage. The two inside tubes are joined in front by a brass casting, which forms the support for the objective ring. Sliding leg rods at the corners give a convenient adjustment in height for different illuminants and a proper tilt to the lantern when necessary.

The construction of the Portable Sciopticon allows all the parts above the bench or frame to be disconnected so that the whole lantern can be easily carried in an ordinary size suit case and still have room for a screen, box of limes and sufficient slides for a lecture.

This lantern will accommodate any illuminant with the exception of the oil lamp. With the short shield (as illustrated) the Hand Feed Arc Lamp, McIntosh Nernst Lamp, Alco-lite or Welsbach Burner can be used. A special steel body is necessary with the Incandescent Lamp, Acetylene Burner, or the Calcium Light Jet.

## THE IMPERIAL SCIOPTICON.

With Steel Body.



PRICE,	with choice of either 6, 8, 10 or 12 inch focus objective in $\frac{1}{4}$ mount, slide carrier and carrying case, without illuminant	\$35.00
"	with No. 3 Jet or Burner.....	45.00
"	with Quadruple Burner for Acetylene.....	41.00
"	with Incandescent Lamp (50 c. p.) with support and cord	39.50
"	with Incandescent Lamp (100 c. p.) with support and cord	41.00

The Imperial Sciopticon, or Single Imperial, when fitted with a steel body, as above illustrated, will accommodate the Oxy-Hydrogen Jet No. 3, Quadruple Acetylene Burner, or Incandescent Electric Lamp.

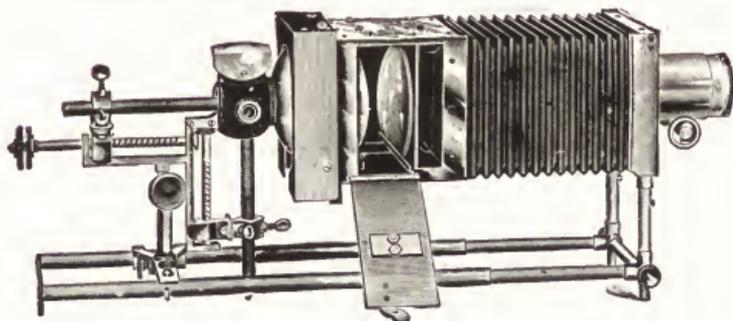
One of the many advantages of purchasing the Single Imperial is that it can be converted into a Double or Dissolving Stereopticon at any time by purchasing a duplicate instrument with the connecting parts, and either a Dissolving Key or a Dissolving Shutter, depending upon which illuminant is to be used.

The general description of the Double Imperial, found on the next succeeding pages, applies to the Single Imperial as well.

We can fit the single instrument with a large, in place of a small body, if preferred, for two dollars and one half additional.

## THE IMPERIAL SCIOPTICON.

With Short Shield.



PRICE, with choice of either 6, 8, 10 or 12 inch focus objective in $\frac{1}{4}$ mount, slide carrier and carrying case, without illuminant, \$35.00	
“ with Upright or 90° Arc Lamp and No. 1 Rheostat.....	50.00
“ with Alco-lite Outfit.....	45.00
“ with large protected body choice of objectives above and 90° Arc Lamp, but without rheostat or case, designed to pass Chicago electrical requirements .....	50.00
“ Set of Parts to connect two single instruments.....	2.00

When ordering electric illuminant, always mention the voltage of your current and whether direct or alternating.

The Imperial Sciopticon or Single Imperial, fitted with short shield, will accommodate the upright form of Hand Feed Arc Lamp, the Alco-lite the Welsbach Burner, or the Nernst Lamp.

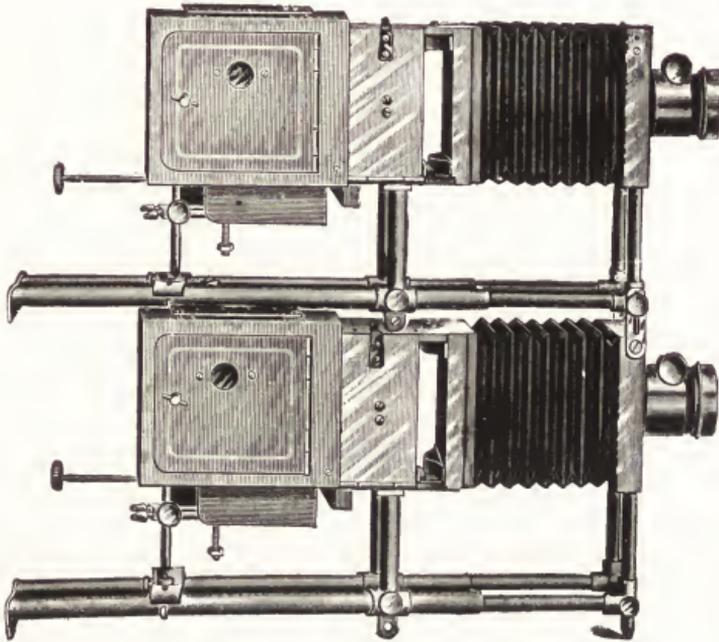
A ball hood and brass shield are furnished with the lantern when the Hand Feed Arc Lamp is used, a steel chimney with funnel shield with the Alco-lite, a special steel jacket with top and funnel shield when Welsbach burner and a short funnel shield when the Nernst Lamp is selected.

A duplicate single instrument purchased with connecting parts can be easily attached at any time to make a Dissolving Stereopticon.

Either the short shield or the steel body can be easily and quickly removed by loosening two screws and substituting one for the other when change of illuminants makes it necessary.

## THE IMPERIAL STEREOPTICON.

With Lime Light.



PRICE, as above, with No. 3 Calcium jets, choice of 6, 8, 10 or 12-inch focus objectives in  $\frac{1}{4}$  mounts, slide carriers and Dissolving Key, complete in case.....\$100.00  
 PRICE, with quadruple jet acetylene burners, acetylene dissolving key, objectives, slide carriers and case..... 85.00

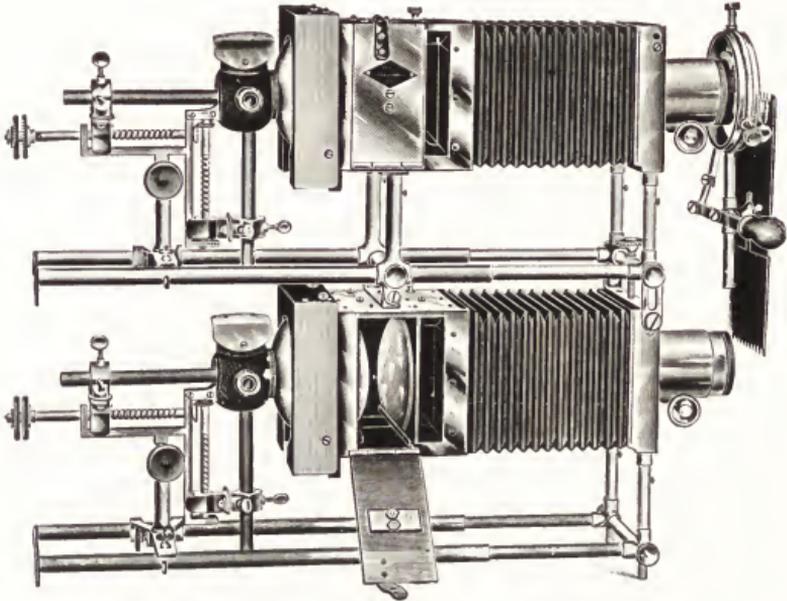
The Imperial Stereopticon is our finest lantern and has been designed to meet the requirements of our customers who want the best and insist upon having it, even tho it costs a little more. The frame is made of special telescoped, nickel-plated tubing, which gives strength, lightness and fine appearance to the lantern.

The condensing lens cells are of original design, which enables the lenses to be instantly withdrawn for cleaning or replacing, and, together with the slide cell, is made of nickel-plated brass.

Objectives of almost any size and focal length can be used, as the front frames carrying the bellows and lens boards draw out and support the objectives, rendering draw-tubes unnecessary.

The upper and lower instruments are made exactly alike and parts are interchangeable. Two single instruments can quickly be converted into a double one by procuring the necessary connecting parts, the only tool necessary to make the change being a screw-driver. All adjustment of the jets in focusing and centering the light, and raising and turning the limes can be made with the doors of the iron bodies closed. In case a change of illuminant is desired, the lime light bodies can be quickly unhooked from the condensing lens cells, by removing two screws, after loosening two small nuts which hold them fast, and the short shields for electric light substituted.

**THE IMPERIAL STEREOPTICON.**  
With Electric Light.



PRICE, as above with Upright or 90° Hand-Feed Arc Lamps with ball hoods, choice of either 6, 8, 10 or 12-inch focus objectives in 1/4 mounts, No. 1 Rheostats, slide carriers and Dissolving Shutter, complete in carrying case .....	\$100.00
“ fitted with attachments for both electric and lime light complete .....	137.00
“ with large protected bodies, choice of objectives above and 90° Arc Lamps, but without rheostats or case, designed to pass Chicago electrical requirements....	100.00

The Imperial Stereopticon is the best instrument that can be made in every particular.

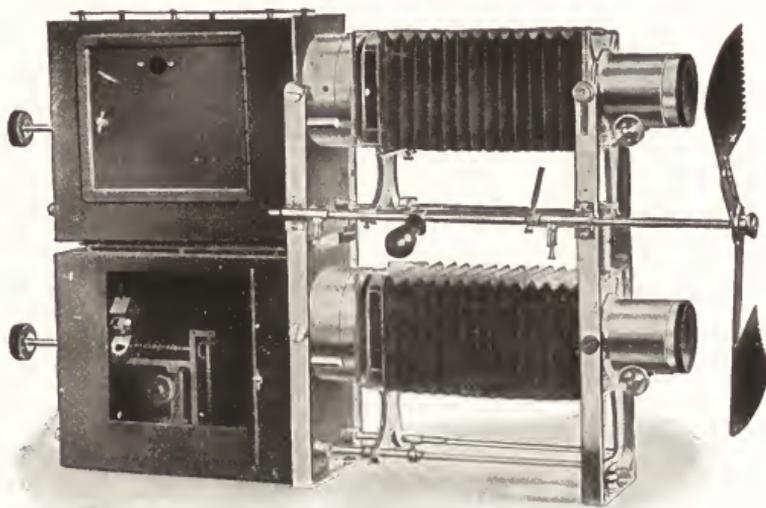
Its design is the result of eighteen years' careful construction, rebuilding and testing, and in it we are confident that we have produced the finest dissolving stereopticon ever built. In this belief we are supported by all the best known lecturers of the country, and many abroad.

The condenser cells are a feature which has been widely imitated. The lantern is strong, rigid, and as compact as it is possible to make it and retain all the desirable features of its design. It is simple and easy to operate, and the working parts are exceedingly accessible.

The material used in the Imperial Dissolving Stereopticon is the very finest brass, carefully selected, and it is a mechanically perfect lantern, as well as being optically perfect.

It is rigidly inspected and carefully tested before being sent out, and our name plate on the lantern indicates that it is backed by our plant and our guarantee against any imperfection whatever of material and construction. We will, at any time, make good any defect which is in any way our fault.

## MONARCH DISSOLVING STEREOPTICON.

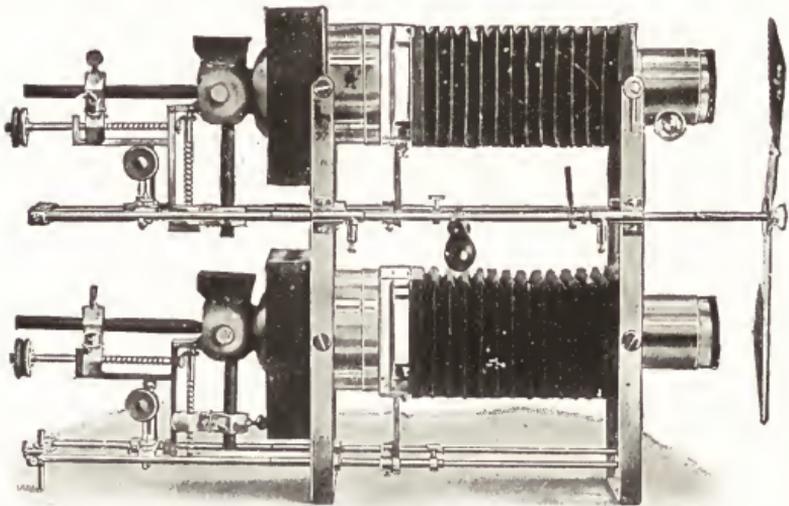


- Monarch Dissolving Stereopticon, complete as illustrated with large bodies, 90° hand feed arc lamps, No. 1 rheostats, choice of 6, 8, 10 or 12-inch focus objectives in 1 $\frac{1}{8}$ -inch diameter mounts, complete with dissolving shutter, slide carriers and carrying case.....\$80.00
- As above without electric attachments, but with a pair of No. 3 Calcium Light Jets, No. 1 dissolving key..... 80.00
- As above with Quadruple Acetylene Burners, dissolving key complete with generator and 10 lb. can of carbide..... 73.00
- The Monarch Dissolving Stereopticon is a good, well made thoroughly reliable lantern at an exceedingly low price.

It is equipped with our regular objective lenses and it can be used with any of our different illuminants except the Alco-lite, which of course is unsatisfactory for a dissolving stereopticon. The objectives are high grade domestic lenses. The arc lamps or calcium light jets are the very finest quality brass made after long experience and experiment, carefully tested, rigidly inspected and absolutely guaranteed. The plate which supports the body and the condensing lens cell, the slide stage and the front plate which supports the objective are all of the best grade gray iron castings. The bench rods and parts which connect the upper and lower lantern are of rolled steel, the bodies are of planished steel of a dull black finish, the bellows are red Morocco. Everything else about the lantern is the finest red brass castings and the entire outfit except the planished steel bodies, plates of the dissolving shutter and the gray iron castings is handsomely polished and nickel plated. It is a handsome lantern, optically and scientifically correct in every detail and is guaranteed against any defect of material or construction.

It is arranged to rest on the two supporting frames of rolled steel. It has an adjustable leg at the back. If it is necessary to raise the front of the lantern in order to elevate the angle at which the picture is projected, the best way is to set the lantern solidly on a base board and elevate the front end of the board by putting a little strip or block of wood under the board.

## MONARCH DISSOLVING STEREOPTICON.



Monarch Dissolving Stereopticon as illustrated, with 90° or upright form Hand Feed Arc Lamps, No. 1 rheostats, choice of 6, 8, 10 or 12-inch focus objectives in 1½-inch diameter mounts, with new type dissolving shutter as illustrated complete with slide carrier and carrying case ..... \$75 00

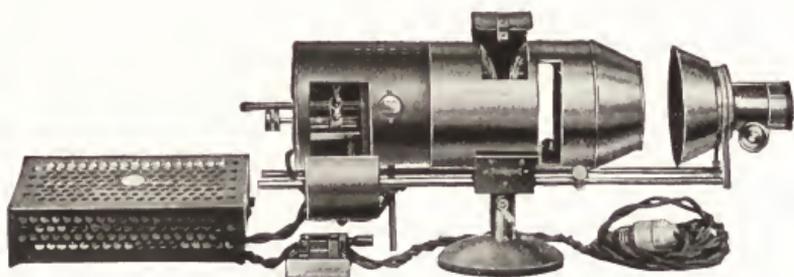
The Monarch Dissolving Stereopticon is the result of a demand for a good high grade dissolving stereopticon at a low price. In the Imperial (page 23), we have produced the finest lantern it is possible to make. The Monarch is built of different material than the Imperial, being steel and iron for the most parts and being a little differently constructed so that a saving is effected in making various parts of it. Of course, it is not as fine a lantern as the Imperial, but it is equipped with the same lenses and illuminants and will produce just as good a picture on the screen as the Imperial or any other lantern.

Its working parts are easily accessible and it is scientifically and optically perfect. Its material and construction are guaranteed against defects of any sort. It does not have several of the exclusive features of the Imperial and will not, of course, stand the hard use and the banging around that the Imperial will, but then, a lantern is not made for, and is seldom given any very great amount of strain or work which will subject it to a very great test of strength. Shipping it around and moving it back and forth from place to place, setting it up and taking it down, etc., are about all the instances where strength is a requisite feature, and, barring accident, the Monarch will, with care, last a lifetime.

It is a good, honest lantern and at the price it is an unequaled value. It is a revolution in dissolving stereopticons.

The dissolving shutter is our new type and is adjustable in four ways so that practically any dissolving effect can be accomplished with it. The whole lantern is well made and backed by our name and guarantee.

## MIOPTICON.



The price of the Miopticon equipped with a choice of 6, 8, 10 or 12' focus objectives in 1 $\frac{3}{8}$ " mounts, and slide carrier, and fitted with arc lamp, rheostat and wire, is.....	\$35.00
PRICE, Miopticon with same equipment, but with 250-watt nitrogen filled lamp, instead of arc lamp.....	35.00
PRICE, Miopticon with same equipment, but with acetylene burner instead of arc lamp.....	35.00
The price of the Tripod is.....	7.50
The price of the Case is.....	5.00

The Miopticon is designed as a compact, convenient lantern which can be used under almost any circumstances and which has an exceedingly general use.

It can be attached to the ordinary incandescent socket, used with either the arc lamp and 5 ampere rheostat or the nitrogen filled Mazda lamp, and because of its extreme simplicity and ease of operation and, at the same time, its almost universal adaptability to conditions, it has found high favor in schools, churches, smaller lodges, Sunday schools, in fact, for any hall where it does not have to be placed at a greater distance than about 40 feet from the screen.

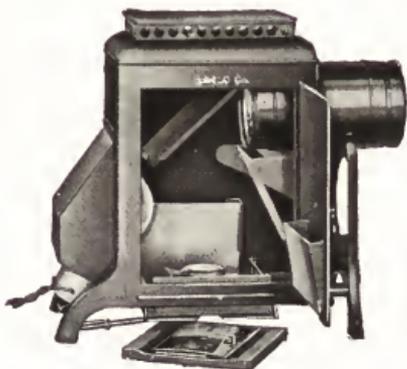
It is constructed of brass thruout, except for the base and body support and the lamp house. It is the very highest grade that can possibly be built. It is guaranteed against any imperfection whatever of material or construction. It is impossible for it to get out of alignment. It is equipped with a real mechanical screw feed arc lamp, in which the carbons are separately adjustable. It has our famous image tube camera, through which to view the arc. It can be set upon a base 5 $\frac{1}{4}$ " in diameter and tilted at any angle, remaining there until you want to change it.

As a commercial lantern, to be carried about to conventions and to be used by salesmen for any bulky articles to show their products, it is exceedingly effective and desirable. Amateur photographers use it as an enlarging lantern and for projecting lantern slides which they make of their favorite subjects.

Special circular on request.

### HOME REFLECTING LANTERN.

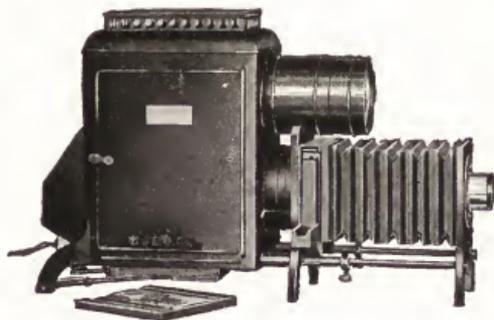
The instrument here illustrated and described is not of our own manufacture, but we have selected it as by far the best lantern of this type on the market, which is still sold at a reasonable price.



The illuminant used is the nitrogen filled incandescent lamp. The post-card, photograph or diagram, etc., is placed in a horizontal position at the bottom of the lantern and brilliantly illuminated by this lamp. The light from it is reflected upward and thence from a mirror forward through the lens to the screen, where it is shown without inversion or transposition. The entire instrument is well made and handsomely finished in black japan.

For use in the home, small class room or Sunday school, we can recommend it very highly.

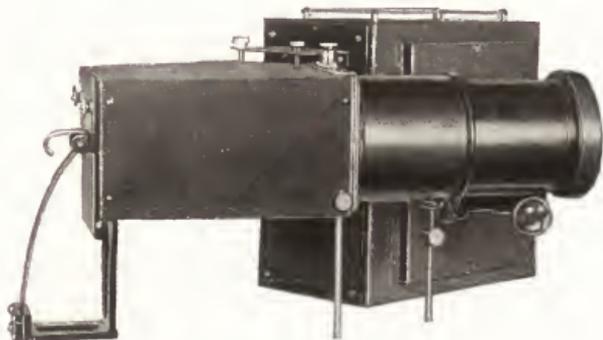
Where desired, this instrument can also be used for lantern slide projection by the attachment of a pair of condensing lenses, slide stage, bellows and objective lens. This additional equipment fits into the lantern, below the opaque projector lens, and including a slide carrier makes the instrument complete for post-card or lantern slide projection interchangeably.



For lantern slide projection it will operate very satisfactorily up to a distance of 30 or 35 ft. from the screen.

PRICE, Home Reflecting lantern complete, for post-card and opaque projection, net.....\$35.00  
 PRICE, complete Home reflecting lantern for opaque and lantern slide projection, net..... 45.00

## McINTOSH OPAQUE PROJECTOR.



In the McIntosh Opaque Projector we present, at a moderate price, an exceedingly efficient, high grade instrument which projects to the screen the reflection of any post-card, Perry picture, photographic print or other natural or opaque object. The non-use of mirrors in this instrument makes for the very greatest efficiency and there is practically no loss of light.

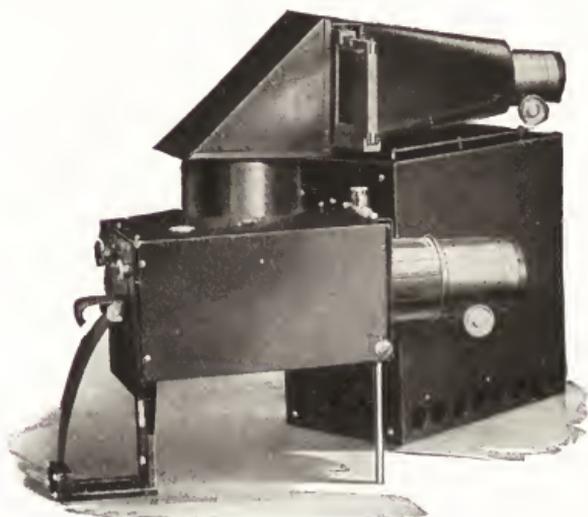
The result is accomplished by direct reflection. The instrument is equipped with a powerful arc lamp, large light tight lamp house, special improved form book holder which permits the use of any size object, high grade lenses, and if it is necessary to transpose the object a mirror may be used, which is furnished with the lantern and which is of the best thin glass, preventing double reflections.

The instrument may be equipped with a special large lens and part of it may be used as an attachment to a number of our different lanterns. It is guaranteed against any imperfection of material or construction and is handsomely finished and first class in every respect.

PRICE, McIntosh Opaque Projector, including lamp house, and 90 degree arc lamp, dark chamber, and book holder as illustrated, condensing lenses, objective and detachable plate and mounted, transposing mirror with rod support..	\$51.00
PRICE, 12½ to 25 ampere rheostat.....	15.00
PRICE, 5 to 45 ampere rheostat, 110 volts.....	30.00
PRICE, Reflecting Attachment, only.....	33.00
Including lenses, book holder, dark chamber and transposing mirror.	
Additional for substituting 4 in. diameter, 15 in. focus objective lens .....	38.00

We will gladly quote you a price on equipping your present lantern with a Reflecting Attachment for the projection of opaque objects.

## THE INTERCHANGEABLE PROJECTOR.



Complete as illustrated with lenses to project an 8x9 foot picture at a distance of 25 feet from the screen and including 12½-25 ampere, 110-115 volt rheostat.....	\$ 90.00
With 4-inch diameter—15-inch focus lens.....	128.00
Additional for substituting 5 to 45 amperes, 110 volt rheostat to either of the above prices.....	15.00

This instrument is designed to meet the demand for a high grade opaque projector which also projects regular lantern slides.

The change from lantern slide to opaque projection and vice versa is instantaneous and is simply accomplished by moving a small lever.

The object holder is such as to permit the use of a large book—any width—and is very easily manipulated.

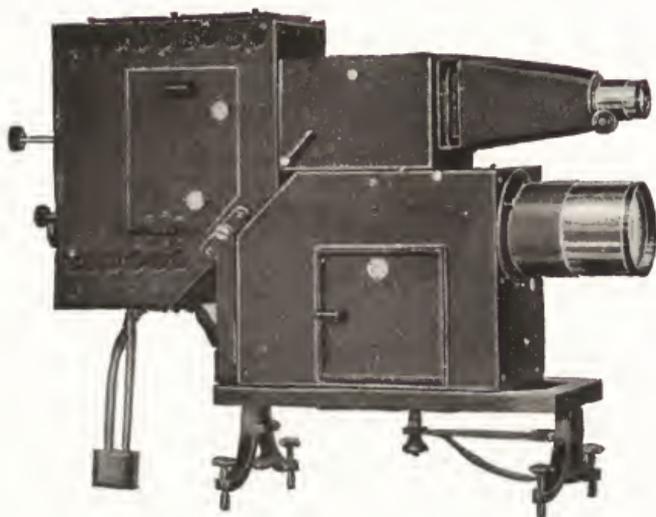
In case a transposing mirror is used for printed matter, the slide projector can be turned to point in any direction.

The arc lamp is our 90° form and the carbons are separately adjustable. The rheostat has a single pole switch so that closed 25 amperes are available for opaque projection—open, 12½ amperes are used for lantern slides.

The body, dark chamber and slide projector are of planished steel—and the whole outfit is guaranteed against any defect whatever of material or construction.

It is the very latest, most improved outfit on the market and is equipped with high grade lenses—an exceedingly good, efficient, honest outfit—not to be equalled at the price and hard to beat at any figure.

## McINTOSH MULTIOPTICON.



(Fig. 1)

The Multiopticon will satisfy the demand for an instrument which projects opaque objects, without inversion or transposition of the image, and which can also be used at practically an unlimited distance from the screen for lantern slide projection.

Schools and Y. M. C. A.'s who desire a thoroughly efficient, high grade projector, find the Multiopticon just that, and also simple and easy to operate, mechanically and optically perfect—in short, an ideal instrument for use in its own particular field. A motion picture mechanism can be added to it at any time.

For school use, it can be built for microscopic, vertical, polariscopic and spectroscopic, physical and chemical experiment; in fact, any sort of projection.

**The Multiopticon** in its simplest form, is for lantern slide and opaque projection interchangeably and is ordinarily fitted with 15" focus 4" diameter objective for opaque projection and 8" focus  $1\frac{5}{8}$ " diameter objective for lantern slide projection.

These objectives produce pictures  $7\frac{3}{4}$  feet square at a distance of 20 feet from the screen, using a  $6\frac{1}{2}$ " square opaque object and a slide having 3" mat opening, respectively.

The instrument is mounted on a heavy casting carefully machined so as to afford absolute accuracy. The dark chamber and lamp house are of polished steel and are perfectly light tight. The alignment of optical parts is accurate so as to afford the utmost efficiency. The arc lamp is mounted on an adjustable support which is controlled from outside the lamp house, and the instrument is instantly interchangeable from lantern slide to opaque projection, and vice versa.

The entire instrument is handsomely finished in dull black which does not reflect any light.

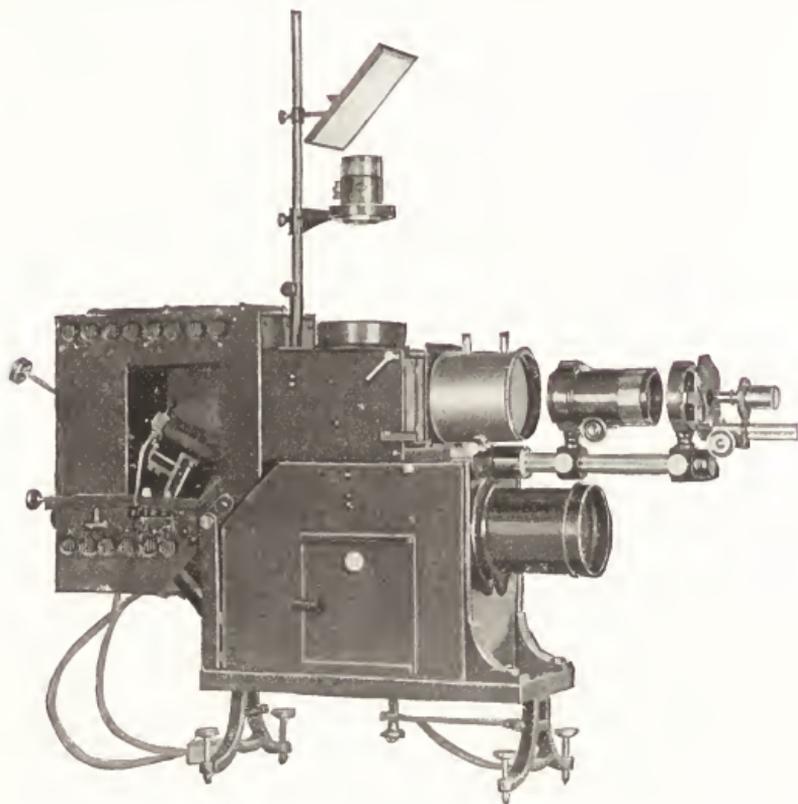
For scientific and technical purposes this lantern may be built up by the addition of the vertical attachment and projection microscope (as shown in Figure 2).

**For lantern slide** projection the lamp house remains in a horizontal position, the beam of light being projected straight forward. The instrument is operated just as any lantern slide projector would be.

To change from lantern slide to **opaque projection**, all that is necessary is to revolve the lamp so that the beam of light is projected directly on the opaque object, which is placed in a horizontal position, and which can be inserted by depressing the bookholder from below or by opening the door in the side of the dark chamber. The light is reflected directly from the opaque object into a mirror placed above it at an angle of  $45^\circ$  and thence thru the lens to the screen. There is no inversion or transposition of the opaque object in using this type of instrument, and the horizontal position of the bookholder permits the use of aquaria, biological specimens and other objects up to  $6\frac{1}{2}$ " square which could not be used in the old form of vertical object holder.

There is, of course, a slight loss of light, due to the use of the mirror, but it is so slight that the advantages of this type of instrument more than make it up.

**For vertical projection**, this instrument is used just the same as in the case of lantern slide projection, except that the vertical attachment is placed above a reflecting mirror in the upper light chamber.



(Fig. 2)

An immediate change is made possible by mounting the mirror so that it is hinged at one end and can be immediately dropped to an angle of  $45^{\circ}$  to the horizontal beam of light, which is reflected up through the lenses and thence forward to the screen.

For microscope projection the light is projected straight forward as for lantern slides. The cooling tank is mounted directly in front of the slide stage, the objective is swung over out of the optical line, the microscope attachment is swung up and clamped in position by the thumb screw which enters a long V groove which keeps it rigidly in optical line.

For microscope projection, wherever possible, we recommend the use of  $5/16''$  carbons, rather than the larger size. These small carbons can be used in the arc lamp of the Multi-opticon, but if it seems more convenient, the regular large carbons can be used with exceedingly satisfactory results.

The equipment for spectra analyses and polarized light can easily be added and made an interchangeable feature of this instrument, as can regular polariscopic projection and motion picture projection.

Any standard **motion picture mechanism** can be used with this instrument, the Edison Type "D" or the Powers 6A being specifically recommended.

The entire instrument passes any inspection of the underwriters and is recommended as the very highest grade outfit it is possible to obtain.

The Multiopticon for lantern slides and opaque projection interchangeably with 4" diameter, 15" focus lens for opaque and Q 8 lens for lantern slide, complete.....	\$140.00
Vertical attachment .....	15.00
Microscope bed of steel, grooved to assure optical alignment...	5.00
Medium Projection microscope and support.....	28.00
Sub-stage condensing lens.....	4.00
Micrometer stage .....	3.00
Cooling tank and support.....	8.00
Auxiliary condensing lens, mounted.....	3.50
Multiopticon complete for lantern slide, microscope, vertical and opaque projection .....	240.00
Additional cost for Edison Model "D" Kinetoscope and attachments .....	175.00
15-25 ampere, 110 volt rheostat.....	15.00
5-45 ampere, 110 volt rheostat, adjustable in 5 ampere steps....	30.00
25-40 ampere, 110 volt rheostat, Gridtype.....	30.00

## MOTION PICTURE MACHINES.

The use of motion pictures is becoming so increasingly popular in every line of educational, religious and general projection as well as for purely amusement purposes that we have made a careful study of the motion picture situation and have selected two machines to recommend specifically to our customers.

These machines are the Edison Type "D" Kinetoscope and the Safety Film Projector.

The Edison we believe to be equal if not superior to any machine on the market—in fact, actual tests conducted in the Edison laboratory, have demonstrated that the Edison Kinetoscope will outwear, by a very considerable margin, any other projecting machine on the market and at the same time shows a minimum wear on the films.

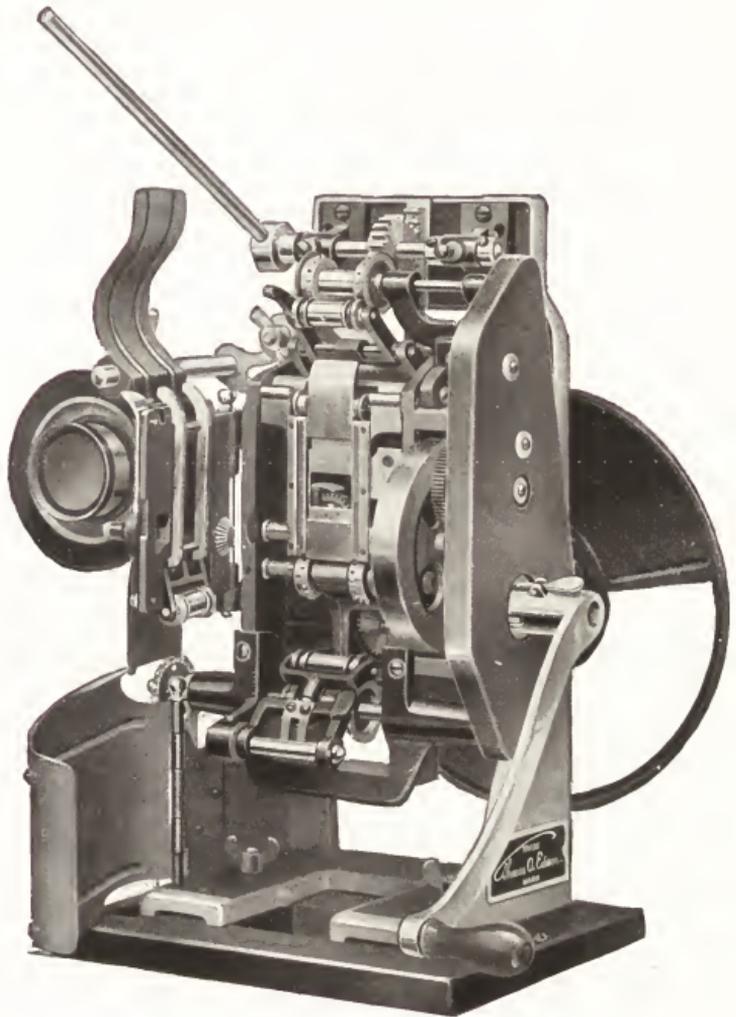
This instrument is made with a one-pin movement, insuring steady and flickerless pictures. Parts can be changed with remarkable ease. The instrument is guaranteed for one year and any defective parts will be replaced free of charge.



### THE EDISON KINETOSCOPE, MODEL "D."

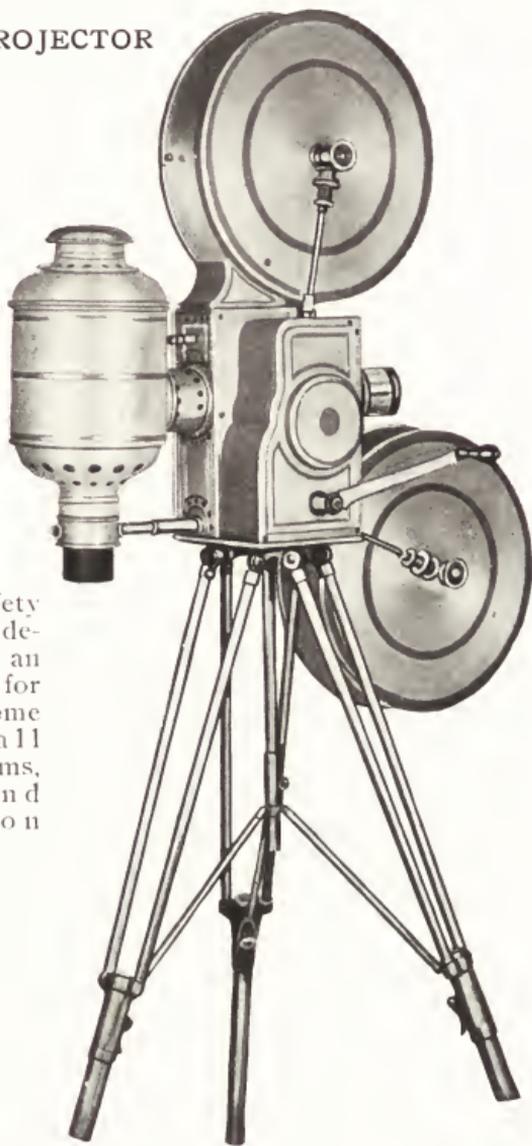
The Edison mechanism can be used as an attachment to any stereopticon which you may now have. A special booklet of the complete machine, and information and prices for attaching the mechanism to your present equipment, will be furnished upon request.

## EDISON TYPE "D" MECHANISM.



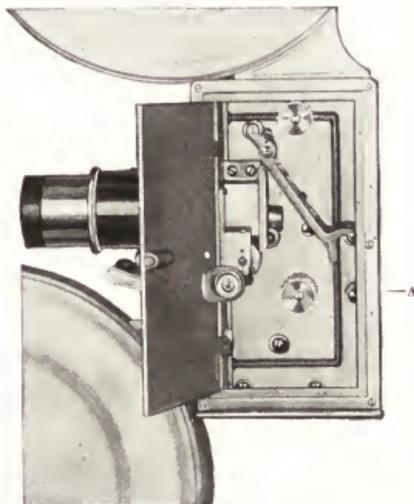
	Code.	Price
Complete with 110v. 25-40 amp. Rheostat.....	Stanziato.	\$250.00
Complete with 110v. 40-60 amp. Rheostat.....	Stanchless.	260.00
Complete with 220v. 25-40 amp. Rheostat.....	Stampede.	275.00
Complete with 110v. 60 cycle Economy Transformer	Stanziava.	270.00
Model "D" Mechanism only.....	Standbild.	165.00
Includes hand power mechanism in polished nickel support, automatic shutter, revolving shutter, film protector, upper and lower film magazines, chain or belt drive take-up attachment, two 11-inch reels, motion picture objective lens and stereopticon objective lens with stereopticon attachment.		
Model "D" mechanism less lenses.....	Standblok.	153.75
Model "D" mechanism less lenses and magazines..	Standesamt.	142.75

## SAFETY PROJECTOR



The Safety Projector is designed as an instrument for use in the home or in small class rooms, churches and exhibition halls.

As illuminant, it uses the 500-watt nitrogen filled Mazda lamp. The film is entirely enclosed, within the aluminum casing which encloses also the mechanism. It is very simple and easy to thread this instrument as will be seen from the cut, showing the film gate with idlers attached. The magazines, casing and lamp house are made of aluminum; the gears are all made of the very best material and are of the helical type so as to prevent lost motion.



**Safety Projector Mechanism (or Head).**

The mechanism is of the standard type and the instrument takes standard films.

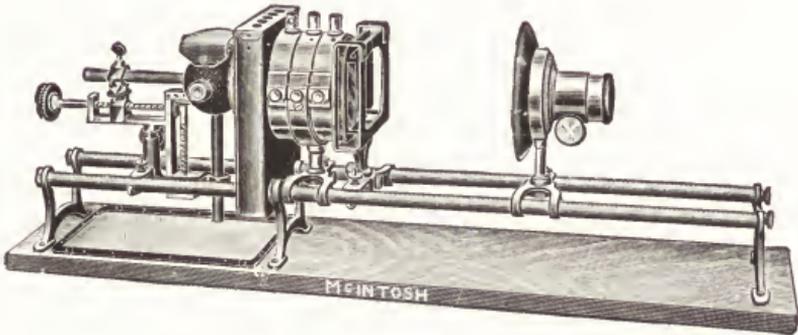
A one pin movement is used, with an internal intermittent shutter. The take-up is operated by a shaft driven bevel gear, insuring positive motion, at the same time, so cleverly devised that there is no possibility of tearing or breaking of the film. To rewind, simply disengage the film from the driving mechanism; slip it over the roller marked "A" in the cut; release the crank from the driving mechanism and engage it with the upper magazine by means of a little clutch and turn the crank backward. No separate film rewinder is required.

The mechanism and magazines can be used as an attachment to any lantern which you now have, and form an ideal motion picture attachment. The attachment as will be noted, includes everything except the lamp house and the tripod.

PRICE, Safety Projector, complete.....\$150.00  
 PRICE, Safety Projector, mechanism only..... 125.00

## IMPROVED COLLEGE BENCH LANTERN.

Arranged for Lantern Slide Projection Only.



PRICE, with choice of 6-inch, 10-inch or 12-inch focus objective in  $\frac{1}{4}$  mount 90° Hand-Feed Arc Lamp, 15 ampere, 110 volt rheostat, slide carrier and carrying case.....\$50.00  
 PRICE, with lenses and arc lamp as above, but with large protected body to pass the Chicago and New York electrical requirements, and slide carrier, but without carrying case or rheostat ..... 50.00

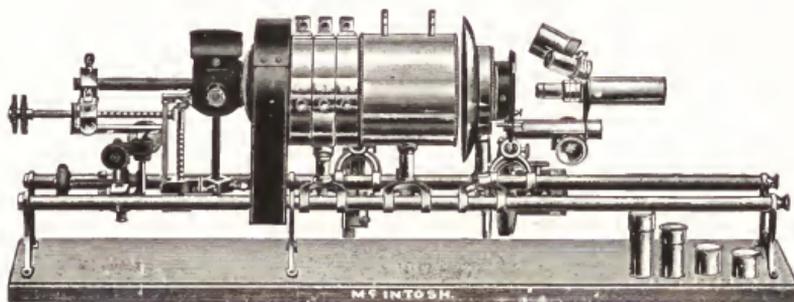
The College Bench is especially designed for school work. It is simple in design, easy to operate, very efficient and produces a beautifully clear, sharp picture. It can be used for almost any projection purpose and its material and construction are guaranteed against any defect. It is mechanically and scientifically perfect.

More than 4,000 College Bench Lanterns are in use all over the country and they are affording universal satisfaction.

We will send one on approval and let you try it out. If it is not in every respect satisfactory, you may return it to us, provided only that it comes back promptly, in good condition, and free of transportation or other charges.

That shows our faith doesn't it, that it is the biggest value on the market. The price is high, but it is a lantern worth the money.

## IMPROVED COLLEGE BENCH LANTERN.



PRICE, as illustrated for lantern slide and microscope work interchangeably, including all the parts listed on page 41, and in addition, the cooling tank, projecting microscope and supports..\$95.00

Extra for double nose piece..... 5.00  
 Extra for triple nose piece..... 5.50

Our Improved College Bench Lantern is the result of careful study as to the varied requirements of a lantern used as an educational medium.

Not only must such a lantern be capable of projecting ordinary lantern slides or transparencies, but must be quickly and easily adapted for scientific projection covering experiments in acoustics, optics, microscopy, physics or chemistry.

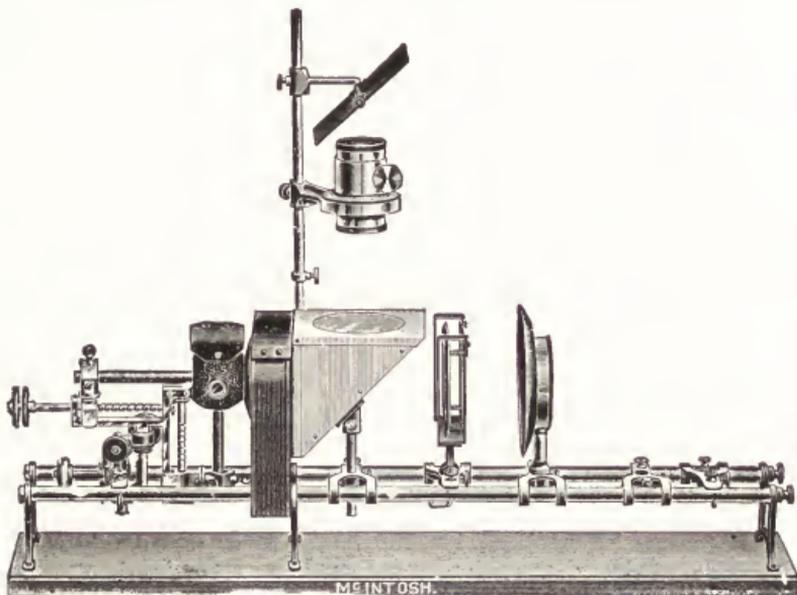
This lantern has for its foundation long nickel plated brass tubes, rigidly held a few inches apart and above a base board by three supporting brackets, forming a track or bench, which holds a series of interchangeable sliding supports, or bridge pieces on which may be secured the various parts necessary for the particular kind of projection work in hand.

The sliding Y shaped bridge pieces are so constructed that they can be either securely locked to the bench, or swung over out of the way on one or the other of the track tubes as desired. This hinge-like movement of the supports is of great convenience, since it enables one to change quickly from one kind of projection work to another.

The cut illustrates the lantern with the cooling tank and projection microscope in position ready for use, but should the teacher desire to project lantern slides, the supports carrying the cooling tank and projection microscope are swung over towards the operator, and the supports containing the slide stage and the regular objective (both partially shown in the cut) brought forward into optical line with the condensing lenses and illuminant.

All sorts of apparatus suitable for projection can be used on the bridge pieces, such as slot and diaphragm attachments, prism support, mirrors, lenses, chemical tanks, polariscopes and crystal stages. An attachment for opaque projection (see page 26) can readily be used with this lantern.

## IMPROVED COLLEGE BENCH LANTERN.



FOR PRICES SEE PAGE 41.

A lantern having a condensing lens of fixed focal length is incapable of producing the best results when used with objectives having a great variation in focal length: for instance, an objective of long focus used with lantern slides, and a high power microscope objective of extreme short focus; to make it possible for the operator to easily and quickly substitute one condensing lens for another, even after the lenses have become heated, we have adopted a new method of mounting, each lens being contained in a separate brass ring so arranged that it can be easily slipped into place and fastened securely in but a few seconds of time.

The advantages of this construction are

1st—That the equivalent focus of the condensing lens system can be changed at will by substituting one lens for another of different focal length, thus giving the operator power to use the combination of lenses which exactly suits the condition under which they are to be used.

2nd—The distance between the condensing lenses can be varied at will, which is an important feature, especially when using high power microscope objectives, since a slight variation in the distance of separation will often increase the illumination on the screen.

3rd—By our method of mounting, the extra condensing lens can be reversed, secured to a support and used to advantage as a projection lens in some experiments. The metal parts of the instrument are nearly all made of an aluminum alloy, which greatly reduces the weight of the entire instrument. The different accessories sold to use with this instrument are all interchangeable in the Y supports.

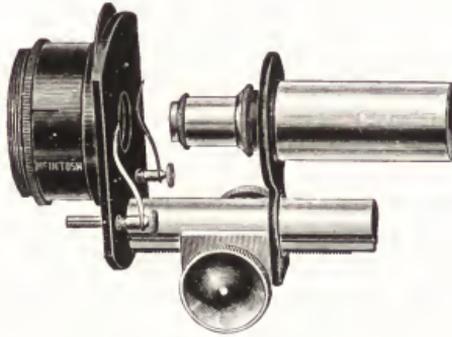
## PRICE LIST OF COLLEGE BENCH LANTERN.

- Price Improved College Bench Lantern *without illuminant*.....\$35.00  
*Consisting of* baseboard with bench, Y support for illuminant, steel light shield, one pair of regular focus condensing lenses separately mounted, one mounting without lens (used as a light shield) special supporting frame for condensing lenses, steel slide-stage, slide-carrier,  $\frac{1}{4}$  size objective with double adapting ring support, three Y bridge pieces for the above parts and wooden case.
- Price Improved College Bench Lantern with Hand Feed Arc Lamp illuminant.  
*For lantern slide projection only*.....\$50.00  
*Consisting of all parts enumerated above* (under heading College Bench Lantern without illuminant) *also* Hand Feed Arc Lamp (either 90° or upright form), ball hood and No. 1. rheostat.
- Price Improved College Bench Lantern with Hand Feed Arc Lamp illuminant, *arranged for projecting both Lantern and Microscopical slides, and quickly interchangeable*.....\$95.00  
*Consisting of all parts enumerated above, also* projecting microscope,  $\frac{3}{8}$  inch microscope objective, double adapting ring support and Y bridge piece, cooling tank and Y bridge piece.
- Price Improved College Bench Lantern for lantern slide, microscope, vertical and opaque projection, including the above equipment and in addition the McIntosh Reflecting Attachment with 4" diameter 15" focus objective, book holder, mounted long focus condensing lenses and transposing mirror with rod support, 25 ampere rheostat instead of a 15 ampere as above, large light tight body, vertical attachment with condensers and objective, triple nose piece for microscope and two additional microscope objectives, the No. 1 Leitz microscope objective and special objective to cover a large field, glass cell for the projection of live objects, sub-stage condensing lens, high and medium power projection eye pieces or amplifying lenses, fine adjusting support for the arc lamp, complete.....\$225.00

### COLLEGE BENCH ACCESSORIES NOT LISTED ON SUCCEEDING PAGES.

- Large Protected steel body for 90° Arc Lamp for College Bench, conforming to Chicago Electrical Requirements.....\$10.00
- Steel body, best oxy-hydrogen jet and rubber hose for tank connection.....\$15.00
- Double adapting ring support.....\$2.00
- Y Bridge Piece.....1.00 3.00
- (Both the above accessories are necessary with microscope if quick change from lantern to microscope slide is desired.)
- Two Condensing lenses (long and short focus) with special mounting for College Bench Lantern. (Necessary for changing the equivalent focus of the condensing lens by substituting one lens for another, see description).... each 2.50
- Standard for holding condensing lens when used as an objective Vertical attachment, with condensing lenses in mirror box, (see description and second cut).....\$14.00
- Adjustable slot attachment.....\$3.50
- Bottle Prism.....4.00
- Prism Stand for Lantern......50 8.00
- (All three necessary in the analysis of light into its colors.)
- Pencil ray attachment with lens and diaphragm. (Very useful in experiments in optics, etc.).....3.50
- Pencil ray attachment with diaphragm only.....2.00

## IMPROVED PROJECTING MICROSCOPE.



PRICE, Projecting Microscope with Diaphragm and Condensing Lens Sleeve, but without Objective.....	\$25.00
“ Micrometer Stage (fine adjustment).....	3.00
“ Special Substage Condensing Lens.....	4.00
“ Special Amplifying Lenses, medium or low power, each	2.00

## PROJECTING MICROSCOPE OBJECTIVES.

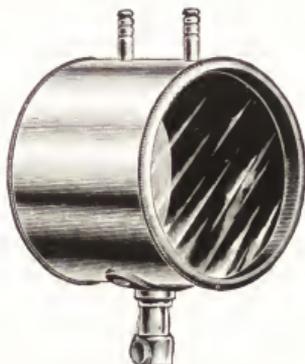
PRICE, 1-inch or 1 $\frac{3}{8}$ -inch.....	24 or 33 mm equivalent	\$ 5.00
“ 1 $\frac{3}{4}$ -inch .....	42	“ 5.00
“ $\frac{2}{3}$ -inch .....	16	“ 5.00
“ $\frac{1}{3}$ -inch .....	8	“ 8.00
“ 1/6-inch .....	4	“ 8.00

The improved Projecting Microscope is designed to meet the requirements of those who desire a really good instrument at a low price. The rack and pinion are cut on the diagonal, which effectually prevents any lost motion between them, thus giving that smooth, steady movement which is so necessary in fine focusing.

The cylindrical portion back of the stage is made up of two parts, the inner sleeve carrying the threaded flange by which the instrument is supported; the outer sleeve is attached directly to the slide stage and is provided with two pointed set-screws which enter a groove around the inner sleeve. By this construction the rack bar can be turned around to any desired position after the instrument is screwed fast to the lantern front, then, by tightening the set screws in the outer flange, the microscope is held firmly in position. The objective support has Society Screw which adapts it to most objectives of American and foreign make.

The shield around the tube prevents stray light from falling on the screen, but it is not so large as to prevent the use of a Double Nose Piece. The front tube can be quickly removed so that wide angle or high power objective can be used without limiting the area of illumination on the screen. The instrument is provided with a revolving diaphragm and sleeve support for Sub-stage Condensing Lens necessary for high power work.

### COOLING TANK.



PRICE, Cooling Tank for Projection Microscope, as illustrated. \$6.00  
 " Special Support when used with our lanterns..... 1.00  
 " Special stand (same as used for prism support)..... .75  
 " Extra Glass Discs for tanks, each..... .20

The cooling tank as illustrated is a seamless brass cylinder with glass ends, which are firmly held in place against especially made round soft rubber rings by brass bezel rings, which screw into the ends of the cylinder. This construction permits of the glass ends being easily removed and cleaned when necessary.

The tank holds about a quart of water and measures 3 inches between the glass ends. It is polished and nickel plated.

A Cooling tank is a necessity when a Projection Microscope is used, the distilled water (alum solution not necessary) with which it is intended to be filled, absorbing much of the heat of the focused beam of light, lessening the danger of injury to the specimen under examination.

A few drops of formaline will prevent the water from becoming stagnant.

### GLASS CELL.



PRICE ..... \$3.50

This Cell, measuring 4 inches in height and 7 inches in length (size of a wood mounted slide), will fit into the slide stage of any lantern using standard size slides. It can be used dry to hold insects, or filled with water showing live specimens from river and pond, such as small fish, leeches, water worms, etc., projected on the screen with a regular lantern objective. It is very useful in illustrating experiments in physics and chemistry, such as capillary action, specific gravity of liquids, electrolysis of water, precipitation, chemical action, test reaction, bleaching process, and antiseptic operations.

The cell is all glass, and is unaffected with acid, alkali or alcohol.

## McINTOSH VERTICAL ATTACHMENT.



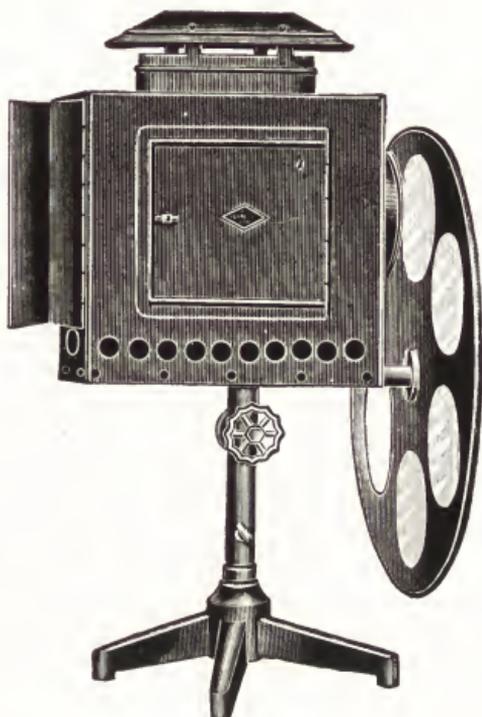
PRICE, with condensers and $\frac{1}{4}$ -size objective.....	\$20.00
“ without condensers and $\frac{1}{4}$ -size objective.....	10.00

The vertical attachment here illustrated is designed to be used as an attachment to the College Bench, Portable Sciopticon, Monitor Sciopticon and where desired, the Imperial.

The use of the vertical attachment is explained on page 14 and we need only say that this vertical attachment is constructed entirely of brass, equipped with the best lenses, the condensers being of the standard  $4\frac{1}{2}$  inch diameter, medium focus; no prisms are used, but the very best thin mirror glass. The upper mirror is adjustable as to angle, and both this mirror and the objective lens are adjustable in planes perpendicular to the vertical axis of the cone of light.

This instrument is exceedingly flexible and simple and easy to operate, at the same time offering the maximum of efficiency.

## ELECTRICAL LENS BOX, OR CHASER.



**PRICE**, with hand feed lamp, color disc and No. 1 rheostat...\$25.00

To project a powerful beam of light, of small or large diameter, either white or colored for tableaux, lodge work or stage effects, furnished with socket swivel so that light can be easily and quickly thrown in any direction, and held there by means of clamp screw. The metal color disc is made in sections so that it is very convenient to replace the colored gelatine mediums. The size of the projected beam of light is regulated by drawing the lamp back and forth on the supporting rods. A tripod stand sufficiently heavy for rigidity takes the place of the heavy, cumbersome floor stand.

## COLORED GELATINE.

<b>PRICE</b> , per sheet, 17x20 inches.....	\$ .20
“ per dozen, 17x20 inches, assorted colors, net.....	1.80
“ per sheet, 8x10 inches.....	.08
“ per dozen, 8x10 inches, assorted colors, net.....	.75

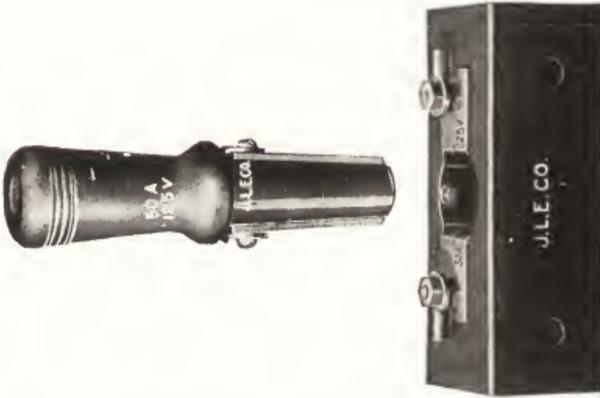
**We do not sell other sizes.**

**FLEXIBLE STAGE CABLE.**

PRICE, No. 10 wire, capacity 20 amp., per ft.....Net, \$0.12

“ No. 8 wire, capacity 40 amp., per ft..... “ .14

Twin wire flexible Stage Cable is the best, safest and approved material for connecting the switchboard (located conveniently just back of the lantern) with the main supply wires of the building either for temporary or permanent use.

**STAGE PLUG AND RECEPTACLE.**

PRICE, Plug and Receptacle.....Net, \$3.50

“ Plug only ..... “ 1.25

“ Receptacle only ..... “ 2.25

The “Kutsch” Plug and Receptacle is the best, safest and approved means of connecting the stage cable to the main line wires in a permanent location.

**ASBESTOS COVERED WIRE.**

PRICE, No. 10, per foot.....Net, \$0.10

Flexible Asbestos covered wire is the best, safest and approved material for connecting the switch and fuse block to the lantern and rheostat, for when used there is no danger of the insulation on the wire burning off and causing a short circuit.

**SOLDERLESS COPPER LUGS.**

PRICE, each .....Net, \$0.10

Patent solderless copper lugs (easily attached by anyone) are fast taking the place of the copper tips for connecting the flexible asbestos covered wire to the lamps and rheostats. Lugs are required and approved by the Chicago Electrical Inspection Department. Tips frequently pull out or jar loose from under the points of the binding screws, but when lugs are used the clamping screw passes through the hole in the lug, thus preventing such accidents.

**KNIFE SWITCH & FUSE BLOCK.**



PRICE, combination knife switch and fuse block on slate base, 25 amp. capacity, without fuses, each .....net, \$1.25  
 " same as above, 50 amp. capacity, without fuses, each..net. 2.00

**PORCELAIN FUSE BLOCK.**

PRICE, Porcelain Fuse Block for enclosed fuses, for single lantern, without fuses, each .....net, \$0.60  
 " For double lantern, without fuses, each.....net, 1.50



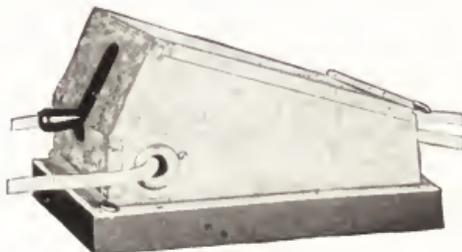
**ENCLOSED FUSES.**

PRICE, Enclosed fuses for the above fuse blocks, 20 amp. capacity, each.....\$0.25 net

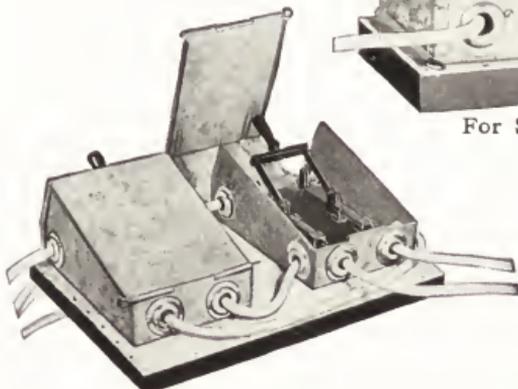
PRICE, 30 amp. capacity, each..... .25 net

Enclosed fuses are much safer than the old "link" style, more easily replaced when "blown out" and meet electrical inspection requirements. They are fast supplanting the "fuse plug" for lantern use.

**COMBINATION SWITCH BOARD.**



For Single Lantern.



For Double Lantern.

The combination switch board is a great convenience and in some localities is required by law. It consists of a double pole knife switch and enclosed fuse box, entirely enclosed in a special galvanized iron box, mounted on an asbestos covered board and equipped with asbestos covered cable. The switch board is priced, single board as illustrated, net .....\$ 6.50  
 PRICE, double board as illustrated, net..... 10.50

RHEOSTATS.



No. 1.

PRICE, No. 1 Rheostat (see cut) with perforated steel cover, capacity 15 amperes, on currents from 110 to 115 volts pressure. Height 12 inches, diameter 6 inches and weight about 8 lbs. ....\$6.00

The No. 1 Rheostat with perforated steel covering is neat and compact and is our standard rheostat furnished with our lanterns unless otherwise specified. Although it has a fixed resistance for currents from 110 to 115 volts pressure (either direct or alternating) the resistance can be very easily adjusted by attaching one of our special "jumper wires" so that currents from 52 to 104 volts can also be used. The steel covering meets Chicago Electrical inspection requirements.

PRICE, No. 2 Rheostat (see cut) without cover, capacity 15 amperes, on currents from 110 to 115 volts pressure. Height 10½ inches, diameter 6 inches and weight about 6 lbs..\$5.00

The No. 2 Rheostat is the same as the No. 1 but without steel cover. We have sold thousands of these rheostats, and they are giving universal satisfaction.



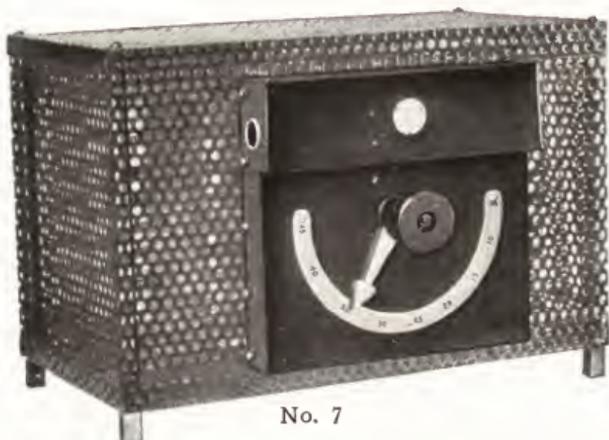
No. 2

PRICE, No. 3 Rheostat, Round Horizontal form, resistance regulated by sliding roller, capacity 15 amperes, on currents from 52 to 125 volts pressure. Length 16 inches, diameter 6½ inches and weight about 12 lbs. No cover ....\$8.00

PRICE, No. 4 Rheostat, Round Horizontal form, resistance regulated by sliding roller, capacity 15 amperes, on currents from 52 to 220 volts pressure. Length 31 inches, diameter 6½ inches and weight about 18½ lbs. No cover.....\$10.00

PRICE, No. 5 Rheostat, Oval Vertical form, wire covered, with knife switch on top, capacity 15 or 25 amperes, on currents from 110 to 115 volts pressure. Height 12 inches, width 11 inches, thickness 6 inches and weight about 15½ lbs.....\$15.00

The No. 5 rheostat is a combination of two No. 2 rheostats firmly held together by two steel bars at the bottom and a steel plate covered with asbestos at the top. A single pole, single throw, knife switch is screwed fast to the top plate. The rheostat is covered with perforated sheet steel cover with switch exposed for manipulation.



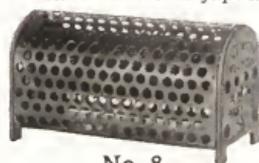
No. 7

PRICE, No. 7 rheostat as illustrated and described.....\$30.00

The No. 7 rheostat is, we believe, absolutely unique. It is designed to operate on 110 volts current, covering a range of from 5 to 45 amperes, in steps of 5 amperes each. Its frame is the best grey iron casting thruout and the resistance is in coils of special wire, having porcelain cores. Although this special wire is of high electrical resistance qualities, it does not overheat and with a given arc, can be maintained at the same temperature and current capacity. This rheostat is provided with an indicating switch as shown in the cut.

The rheostat is covered with perforated sheet steel and entirely finished in black japan and nickel.

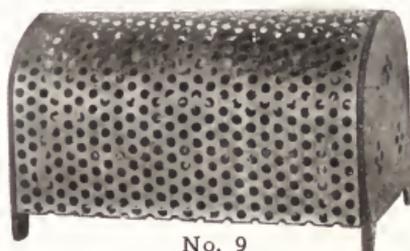
The No. 8 rheostat is for use on 110 volt circuit and is one spiral coil of coiled high resistance wire. The same is used in the No. 8 as in the No. 7. It has a capacity of 4½ amperes, so that it is possible to connect to the ordinary incandescent socket. It is covered in perforated sheet steel and handsomely japanned.



No. 8

PRICE, No. 8 rheostat.....\$6.00

The No. 9 rheostat is the same style and the same resistance wire as the Nos. 8 and 10, but it is larger, consisting of three coils so as to afford 5 amperes of current on 220 volt circuit.



No. 9

PRICE, No. 9 rheostat.....\$10.00  
 PRICE, No. 10 rheostat, 4½ to 9 amperes, 110 volt.....\$10.00

## THE McINTOSH HAND-FEED ARC LAMP.

For Direct Current

For Alternating Current



PRICE of McIntosh Hand-feed Arc Lamp only, for use on either Direct or Alternating Current.....	\$ 8.00
PRICE of above, with No. 1 rheostat.....	14.00
“ Ball hood for either direct or alternating current, net..	1.00

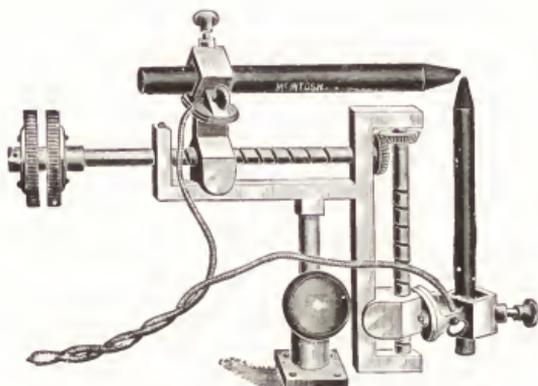
The Upright form of Hand-feed Arc Lamp is sometimes preferred to the 90 Degree Form, particularly for use where current greater than 35 to 40 amperes is to be used.

The Upright Arc Lamp is fed by single hand wheel which feeds with a rack and pinion adjustment, both carbons. The same lamp can be used with a different adjustment as illustrated for direct current and also for alternating current.

Using more than 15 amperes of current, the Upright form of Arc Lamp works very satisfactorily. It cannot be used with any degree of satisfaction, attached to the incandescent socket, but requires special wiring, because of the fact that it is necessary to use a heavier current with it than can safely be drawn from the incandescent socket.

## HAND-FEED ARC LAMP.

90° or Right Angle Form.



PRICE, Lamp only, with square base or support as illustrated... \$ 8.00

“ Complete with No. 1 rheostat, square base, or supporting

stem for any of our Lanterns as desired..... 14.00

“ Ball hood, when desired, extra, net..... 1.00

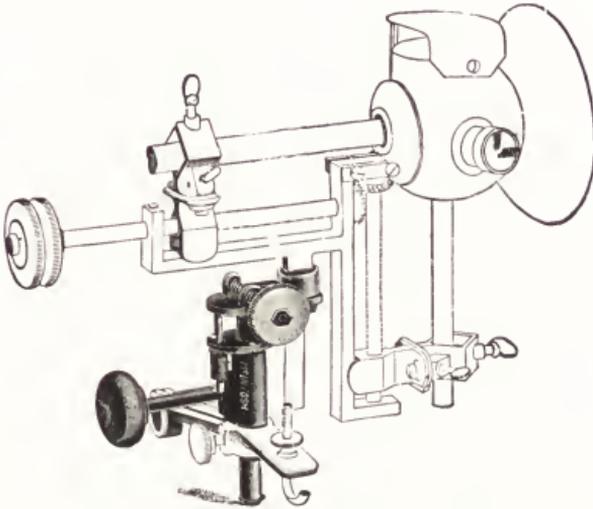
The 90° or Right Angle Arc Lamp has one advantage over the regular up-right form, since the Arc can be kept nearer in line with the center of the lenses for a greater length of time without re-adjusting the carbons in the holders, than with the up-right form, since the horizontal carbon is placed in line with the optical axis and is fed directly towards the center of the condensing lens, the point of the carbon being the source of light.

We offer the above as the most simple and effective Right Angle Lamp on the market. It is very small (size of frame, 4 $\frac{7}{8}$  inches long by 4 $\frac{7}{8}$  inches high) and still has a 2 $\frac{3}{4}$  inch feed to each carbon. The carbons can each be fed separately or together, depending on how one grasps the feeding wheels. Operated on direct current a  $\frac{3}{8}$  inch solid vertical and a  $\frac{1}{2}$  inch cored horizontal carbon are necessary; if upon the alternating current both carbons should be  $\frac{1}{2}$  inch cored. On direct current this Lamp will give more light, using the same amount of current, than the tilted form, but it requires a little more attention in feeding.

It is necessary to have at least 5 $\frac{1}{2}$  inches from the center of the condensing lens to the bottom of the lantern body in order to be able to center the 90° Lamp.

## FINE ADJUSTING SUPPORT.

Shown with 90° Lamp Attached.

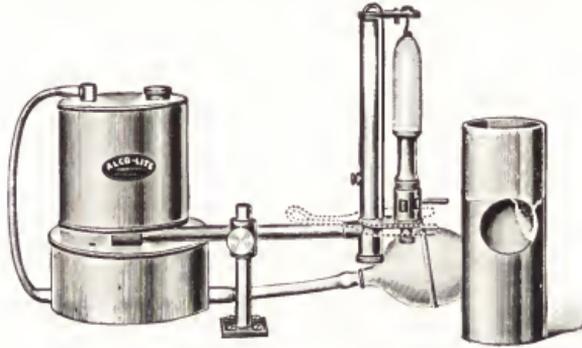


PRICE, of Support, for either up-right or 90° Lamp, (shaded portion, of cut only).....	\$5.00
" " 90° Lamp with ball hood and its attachments.....	9.00
" " up-right Lamp with similar ball hood for either direct or alternating current, as desired .....	9.00

The cut shows the attachment in position, clamped to a Y support (which forms a part of our Imperial lantern) and holding a 90° Lamp fitted with a ball shield having a flange in front, heat deflecting plate on top, and an image tube at the side. By the use of this Support the Arc is kept in perfect alignment with the center of the lenses by means of two screws, one (at the back) moving the entire Lamp up and down, the other (at the side) giving a lateral swinging motion. This Support is particularly recommended where a projecting microscope or moving picture machine is used. When the Lamp is in operation a perfect reduced inverted image of the carbon points is seen on the ground mica disc at the end of the image tube (see cut) indicating to the operator their exact position and how to feed the carbons to produce the best results on the screen.

ALCO-LITE.

Our New Projection Lamp Burning Alcohol.



PRICE, Alco-lite, all brass, with rubber bulb, pressure regulator, mantle, and instructions for operating .....	\$10.00
" Alco-lite mantles in any quantity less than one dozen, each, net .....	.15
" Alco-lite mantles, per dozen.....	1.50
" Extra Pressure Regulator discs .....	.40
" " Rubber Bulbs .....	.25
" " Mantle Hooks .....	.10
" Denatured Alcohol, in one-gallon wood jacketed cans.....	.85
" " " three-gallon " " " .....	2.30

(Alcohol subject to market fluctuations)

When ordering, state if lamp is to be used inside a large lantern body (when it requires a plain chimney) or with lantern body having only a short light shield back of the condensing lens, in which case a funnel shield is necessary around the opening in the chimney. Also indicate if a plate base (as illustrated above) or a "set-over" supporting stem, fitting any of our lantern "Y" bridge pieces, is desired.

Alco-lite is a new form of projection lamp using a mantle, and burning "Industrial" or "Denatured" alcohol, which consists of "Grain" alcohol, with the addition of a small quantity (10%) of "Wood" alcohol, rendering it unfit for drinking purposes, and thereby causing it to be exempt from Internal Revenue tax. Pure "Grain" alcohol, or "Columbian Spirits," can also be used with equally good results, but they cost a little more than "Denatured" alcohol. The lamp consumes but five ounces per hour which, at 85c per gallon, costs only 3c. The tank holds ten ounces, or enough for a two hours' run.

The light produced is next in brilliancy to Calcium light, and will make a good, clear, satisfactory picture up to nine feet square. It has many points of excellence to recommend it to our customers who, from force of circumstances, cannot use Electric or Calcium light:

It is very compact and light in weight.

It costs but little to operate.

It is perfectly clean, smokeless, gives off no disagreeable odor, and does not require cleaning after being used.

It is so simple that a child can learn to operate it.

It is perfectly safe.

It can be used with almost any kind of a single lantern using standard-size lantern slides.

It is sold at a very reasonable price.

**THE McINTOSH-NERNST PROJECTION LAMP.**



- PRICE, with choice of plate base as illustrated, or tube support to fit our lanterns, 10 feet of lamp cord with plug, and lighting torch, complete.....\$10.00
- PRICE, with choice of plate base as illustrated, or tube support to fit our lanterns, 10 feet of lamp cord with plug, and lighting torch, complete.....\$10.00
- “ Burner complete with “glower” for either direct or alternating current for standard voltages.....net .85
- In filling orders we will select the burner to suit the voltage and kind of current specified.
- “ Glass Resistance Tube or “ballast”.....net .75
- “ Light shield for lamp when not enclosed in body.....net .50
- “ Polarity Indicating Paper, per dozen strips.....net .05

This new lamp is an ideal source of light for the stereopticon where a small or medium size picture is required in the home, church or school for the following reasons:

- The light is strong, white and steady.
- It requires no attention when once started.
- It is noiseless, small, simple, clean and convenient.
- It requires no special wiring, rheostat or switch, and can be attached to any Edison socket.
- It is very economical in the consumption of current.
- It will produce a better picture than either Acetylene or Alco-Lite.
- It is sold at a very reasonable price.
- The rated life of the “glower” on direct current is 600 hours and on the alternating current 800 hours.

The burner containing the “glower” screws conveniently into the front of the casting like an incandescent lamp. The “glower” is protected from injury when not in use by the metal cap shown in the cut.

In this lamp the delicate heating coil commonly used under the “glower” to start the flow of current is dispensed with as being a source of annoyance in frequently burning out and an unnecessary expense. A neat special alcohol torch for heating the “glower” is furnished with the lamp.

The glowers forming part of the burners are necessarily delicate and we will not be responsible for damage in shipment or use.

## THE INCANDESCENT ELECTRIC LAMP.

The recent introduction of the nitrogen filled Mazda lamp as described on page 8 has practically eliminated all other forms of incandescent lamps from the field of projection apparatus.

We offer now only two forms of projection incandescent lamps which are described and priced below. Other types of concentrated filament, incandescent lamps will be supplied if desired, and special information about them will be given upon request.



PRICE, 250-watt, plain lamp.....	\$3.50
" 250-watt, lamp with silvered back.....	4.50
" 500-watt, plain lamp.....	6.00
" 500-watt, lamp with silvered back.....	8.00

The 250-watt lamp with the silvered back can be used in any of our lanterns and it is safe to say it can be fitted to any lantern on the market. It will produce a good picture up to 10 ft. square at any distance not more than 40 ft. from the screen.

For use in connection with it, we recommend the half size or  $2\frac{7}{8}$ " diameter objective lens, rather than the  $\frac{1}{4}$  size which is  $1\frac{5}{8}$ " diameter.

With the 500-watt lamp, which can be fitted to most of our lanterns, but which is much larger than the 250-watt lamp, a 10 ft. picture can be projected up to a distance of 50 ft. from the screen.

For use at a reasonable distance from the screen, these lamps are very desirable as they require no attention whatever in operation; simply turn on the switch and they light, just like any ordinary incandescent lamp; when you are thru, turn off the switch and there is no further attention required to the lamp.

Also they do not require any attention in operation, such as feeding the carbons, etc. Either of these lamps can be attached, with perfect safety, to the ordinary incandescent socket.

These lamps are tested before being shipped and cannot be returned.

## IMPERIAL ACETYLENE GENERATOR.



Dimensions: Height 19 in., Diameter 8½ in., Weight 10 lbs.

Price of Imperial Generator..	.....\$8.00
Price of Carbide in 10 lb. tin cans.....	1.00

The Imperial has the following points of superiority.

1st. It is very simple in construction, easy to understand, and perfectly safe to operate.

2nd. The generation and pressure of the gas is at all times under the control of the operator. Generation can be increased, diminished or stopped at will by merely turning the knob (A) at the top of the long screw to the right or left, the operation either lowering or raising the entire gas container (C) and the enclosed Carbide basket (D) in the water.

3rd. Ordinary lump Carbide is used, which is easily obtained, instead of Carbide of special crush or size being required, as in some generators.

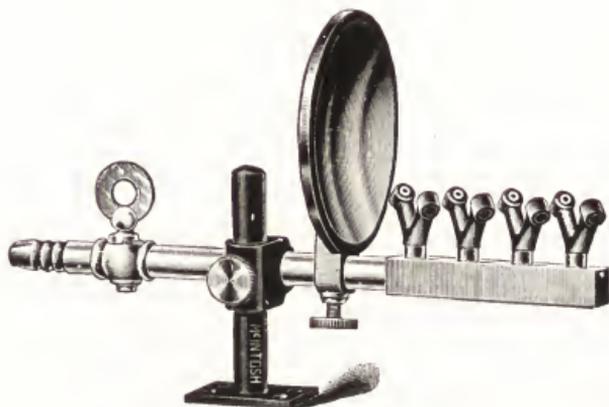
4th. Ample surface is provided for the condensation of moisture and cooling of the gas in the spiral tube (E) and the condensing chamber (F) at the bottom of the water tank (B).

(The delivery to the burners of cool dry gas insures the obtaining of a pure white light).

5th. The basket (D) has a capacity for two pounds of Carbide, or sufficient for a two hours' run.

**Directions for operation accompany each generator.**

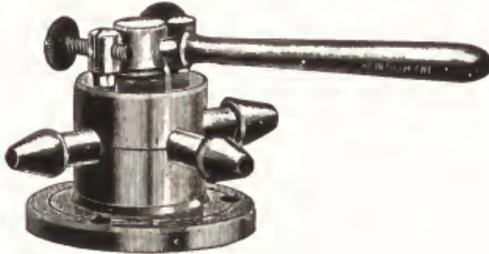
## QUADRUPLE ACETYLENE BURNER.



PRICE, with plate base or post support to fit our lanterns as desired, \$6.00  
 " single Crescent burners with conical base, like those forming the large one, each..... .50

The Quadruple Acetylene Jet is made up of four burners, each consuming three-fourths of a foot of gas. Each burner has two tips, so placed that when used the two jets of gas issuing therefrom impinge on each other at an angle, producing a small, flat flame of intense brilliancy, which appears to float above the burner, thereby preventing almost entirely the deposit of soot at the tip which was formerly a great drawback to the use of acetylene. The four burners are placed close together and set so as to present their flames diagonally to the surface of the lens, for the purpose of condensing the light into as small an area as possible, which is very necessary in a good lantern illuminant. The reflector is of correct curvature to give the best results on the screen. We are now using the celebrated all lava Crescent burners, which can not get out of alignment.

**ACETYLENE DISSOLVING KEY.**



**PRICE** ..... \$5.00

This Key is very carefully constructed of brass, nickel-plated; the supply of gas remaining in the Lantern which is not projecting the picture is regulated by the amount of throw of the lever handle, which is adjusted by stop-screws, one on each side.

**CRESCENT BURNER CLEANER.**



**PRICE,** ..... net \$0.25  
 " By mail ..... " .30

The above instrument will be found very useful in removing any obstruction preventing the flow of gas from the fine openings in the acetylene burners. Care should be taken in using the cleaner not to nick or chip the edge of the small holes. A little defect in the tip will cause the burner to smoke.

**ANNEALED GLASS DISC.**

(Imported.)



**PRICE.** Annealed disc mounted for use with Imperial lantern as above ..... \$1.00  
 " Annealed disc with two spring rings for mounting glass in take-up ring of College Bench Lantern..... .60  
 " Annealed disc with ring of small wire to separate it from condensing lens when used in round box mounting..... .50

In order to lessen the danger of breaking the lens next the light by heat, we recommend the use of one of these annealed discs placed between the light and the condensing lens.

LIMES.



PRICE, (per can) one dozen Limes,  $\frac{7}{8}$ "x $2\frac{1}{4}$ " .....\$1.00  
 " (per dozen),  $1\frac{1}{4}$ "x $2\frac{1}{2}$ " ..... 2.00

Our Limes are of superior quality, neither too hard nor too soft; their incandescent properties are unsurpassed. We put them up in screw top tin cans containing one dozen each—the cans being so constructed that they can be hermetically closed every time after they are used by the consumer.

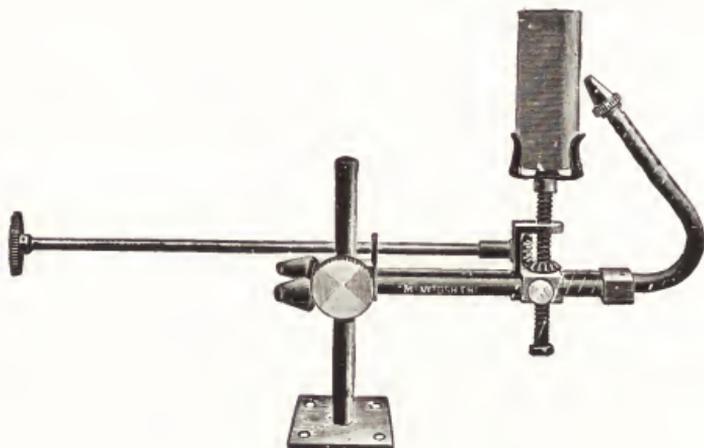
We also furnish English Limes; those that have a hole drilled through the center.



PRICE sealed in glass, regular, per dozen .....\$1.50  
 " sealed in glass: regular, each ..... .15  
 " English Limes, sealed in glass only, per dozen ..... 2.00  
 " English, sealed in glass, each ..... .20

The advantage of being able to buy single selected limes, hermetically sealed in glass will be greatly appreciated by persons who use lime light but occasionally, and who have been obliged in the past to purchase a fresh box for each lecture, as their unused limes had slacked in the interval between lectures.

### OXY-HYDROGEN JET NO. 3.



PRICE, with square base, or crowfoot, as desired, with stop-	
cocks .....	\$12.00
“ with square base, or crowfoot as desired, without stop-	
cocks .....	10.00
Goose-necks for No. 1 or No. 2 Jet.....	each, 1.00
Tips for Oxy-hydrogen Jet No. 3.....	“ .50

The Mechanical Jet, as illustrated, is a result of a series of experiments to produce a Jet better than any on the market. It is small and light in weight and can be fitted to almost any Lantern. It will produce a very powerful light without noise or waste of gas. It has a large mixing-chamber (the entire length of the jet pipe) and gives a thorough mixture of the gas before it issues from the tip. The tip can be replaced without trouble and with but slight expense should it become injured by the hot lime resting against it. This Jet is furnished with our best instruments.

### LIME TONGS.

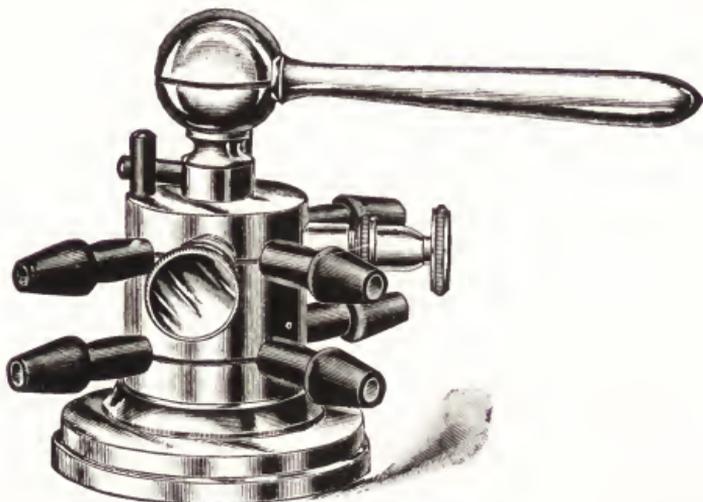


PRICE .....

.....each,	\$0.60
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The above instrument is exceedingly convenient in handling hot limes or carbons and should not be omitted from a complete outfit.

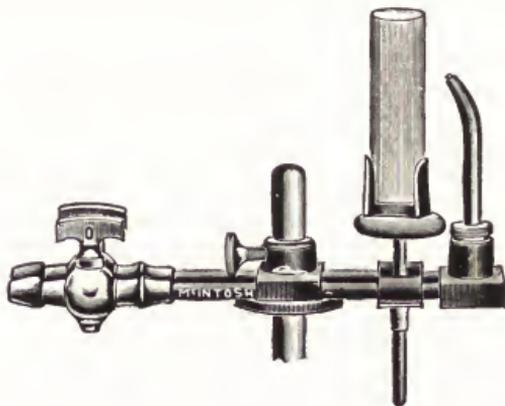
DISSOLVING KEY No. 1, WITH ADJUSTABLE VALVES.



PRICE.....\$12.00  
 " with stopcocks..... 15.00

This Dissolver is made especially for mixed gases, and works equally well with the ether-oxygen and oxy-hydrogen gases. It is finely fitted, accurately adjusted, and each one is tested before sending out.

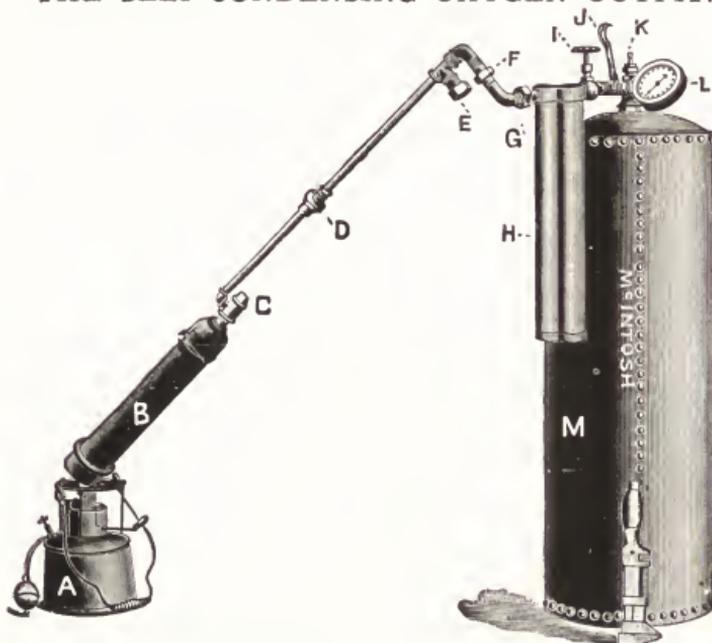
ADJUSTABLE JET OR BURNER Nos. 1 and 2.



PRICE, No. 2, with stopcocks.....\$8.00  
 Jet No. 1 without stopcocks..... 6.00

The No. 2, having stopcocks, can be used with cylinders or with the Ether-Oxygen Lime Light without alteration.

## THE SELF-CONDENSING OXYGEN OUTFIT.



PRICE, for Oxygen outfit.....	\$50.00
“ with Ether Saturator.....	60.00

## DESCRIPTION IN DETAIL.

- A. Gasolene Forge for heating retort.  
 B. Iron Retort in which gas is generated.  
 C. Opening closed by screw cap where retort is filled.  
 D. Brass Union where retort is disconnected.  
 E. Brass Union containing Safety Blow-Out Disc.  
 F. Brass Union acting as a joint to enable retort to be swung side-wise.  
 G. Brass Union acting as joint to enable retort to be swung up or down. Also place for filling Safety Gas Washing Tubes.  
 H. Safety Gas Washing Tubes, preventing water from blowing back into hot retort should cylinder valve (K) be carelessly opened when cylinder pressure exceeded retort pressure on second charging.  
 I. Globe Valve, which, when opened or closed alternately, with Main Spindle, or Needle Valve, enables either retort or cylinder pressure to be registered on the Pressure Gauge (L).  
 J. Cylinder Wrench placed on side or regulating Spindle of Cylinder Needle Valve. This valve is kept closed when gas is generating and is the valve used to control the flow of gas to the jet after cylinder is charged and disconnected from the generating portion of outfit.  
 K. Main Spindle of Double Needle Valve.  
 L. Pressure Gauge registering cubic feet and pounds pressure on the same dial.  
 M. Gas Cylinder, 12" x 36" tested to 200 pounds hydraulic pressure.
- The outfit also includes a pipe tongs, a monkey wrench, a hand-forged steel cylinder wrench, a cleaning rod for retort, extra washers and blow-out disc, and funnel for filling retort, a two-tube Ether Saturator, a small filling funnel, eight feet special rubber hose and T tube for connecting Saturator and Cylinder with jet.

### THE SELF-CONDENSING OXYGEN OUTFIT.

Consists of a special cylinder for holding oxygen gas, furnished with Patent "Double Needle Valve," a complete gas generating, washing and compressing outfit, and a two-tube Ether Saturator. The use of the Saturator is to convert part of the oxygen gas into a mixture of ether vapor and oxygen which exactly takes the place of hydrogen and renders the use of a second or hydrogen cylinder unnecessary.

The Oxygen gas is made from a mixture of Crystalline chlorate of potash, four parts by weight, to one part of powdered black oxide of manganese, which can be purchased at any drug store.

The gas is liberated from the chemicals by heat, and being confined, produces sufficient pressure to charge the cylinder at once. The apparatus is perfectly safe, easily managed, economical and convenient to transport, weighing about 100 pounds. The light obtained is fully equal to calcium light operated with two gases, either from bags or cylinders. All gas left over at the close of an entertainment is saved for the next exhibition, and more can be made and forced into the cylinder at any convenient time. The owner of this outfit is practically independent of any gas supplying house.

**Special directions accompany each Outfit.**

### CHEMICALS.

The chemicals used in making oxygen gas are Potash-Chlorate and the black Bin oxide of Manganese. We put them up mixed, ready for use, in packages of 2½ lbs. each in the proportion of four parts of Potash to one of Manganese.

PRICE, per package.....net. \$0.75  
 PRICE, per dozen.....net. 8.50

### ETHER.

The best grade only of Sulphuric Ether should be used with the Saturator. Our ether is manufactured especially for this purpose and put up under our own label in sealed tin cans.

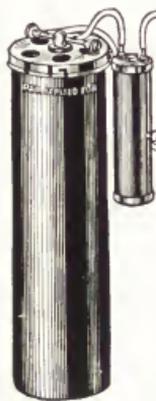
PRICE, per pound can.....net, \$0.65

**These prices are subject to the fluctuations of the market.**

## ECONOMIC CALCIUM LIGHT OUTFIT.

The Economic outfit is an instrument designed for the generation of oxygen, so as to make calcium light practicable, without the use of the bulky outfit, usually supplied. While it is not quite so efficient as gas in tanks, or the Self Condensing Oxygen Outfit, it is far more efficient than any other equipment on the market.

The oxygen is generated by the action of the chemical known as oxone when combined with water, this action taking place in the large gas tight tank. The smaller tank, also called a saturator, is filled with a core of cotton or some other absorbent material, which is saturated with ether.



Two tubes pass from the large tank containing oxygen to the jet, one of them going thru the ether saturator on the way. The result is that hydrogen and oxygen gas are furnished, mixed at the jet, projected against a pastil of refractory quality, which by the burning of the gases against it, is heated to a state of white hot incandescence, producing a light second only to electricity.

This instrument is very economical to operate and is also exceedingly low in price.

PRICE, complete Economic Calcium light outfit, including jet.	
but no chemicals or pastil, net.....	\$16.50
“ Oxone, per box, containing 16 cakes, net.....	1.35
“ per dozen boxes of Oxone, net.....	15.00
“ Guil pastile, net.....	1.25
“ per lb. can of ether, net.....	.65

## TWO-WAY ATTACHMENTS.

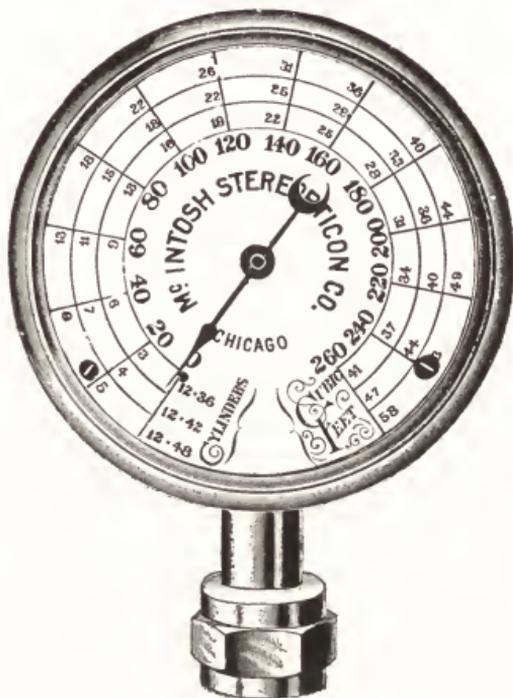
For tank valves.



These attachments are valuable additions to a lantern outfit when gases from tanks are used.

PRICE, highly finished and nickel plated, each.....\$3.00

THE McINTOSH CYLINDER GAUGE.

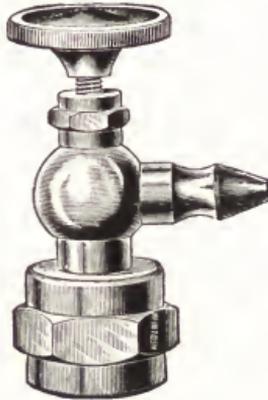


PRICE, first quality, indicating cubic ft. and lbs. pressure.....\$6.00  
 " second quality, indicating lbs. pressure only..... 4.00

The cut illustrates our first-quality Pressure Gauge, which is made of brass, handsomely nickel-plated, with thick bevel glass crystal. Its scale is calibrated for three sizes of cylinders, 12 in. x 48 in.—50 ft., 12 in. x 42 in.—40 ft., 12 in. x 36 in.—35 ft., the capacity being taken when at about 225 lbs. pressure to the square inch. The number of cubic feet of gas in the cylinder is indicated at once, without calculation, by reading the number on the circle indicating the size of the cylinder being tested. The Gauge measures  $3\frac{3}{8}$  in. at its largest diameter.

The second-quality Gauge is constructed of Japanned-iron, with a brass bezel ring and plain glass crystal, and measures  $4\frac{3}{8}$  in. at its largest diameter. This Gauge indicates pounds pressure only, and in using it it is necessary to know the capacity of the cylinder in feet, and to calculate the contents from the pressure indicated. Both couplings are threaded to the standard, and will fit any cylinder. The Pressure Gauge is a necessity when compressed gases are used, so that the operator is not kept in doubt as to the amount of gas remaining in cylinder at any time after an exhibition. As low as four and as high as ten feet of gas per hour can be used with the same jet. The average consumption, however is about seven ft. per hour.

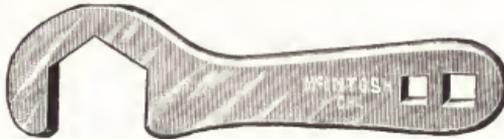
### REGULATING NEEDLE VALVES.



PRICE, nickel plated.....per pair, \$5.00

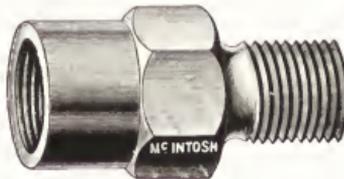
Very useful attachments for cylinders. The steel spindles have fine thread which enables the operator to adjust the gases quickly and delicately without their blowing or hissing. No outfit is complete without them.

### IMPROVED CYLINDER WRENCH.



PRICE, nickel plated.....\$0.60

Drop-forged, nickel plated steel wrench,  $4\frac{1}{8}$  inches long,  $\frac{3}{8}$ -inch thick, round corners; will not cut the pocket.



Adapters, highly finished and nickle plated, each.....\$0.75



Hose connectors, highly finished and nickle plated, each.....\$0.60

## THE LECTURER'S READING STAND.

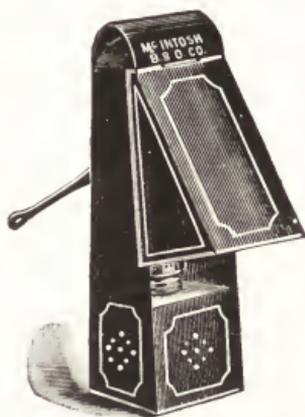


**Light, Compact, Convenient, Practicable.**

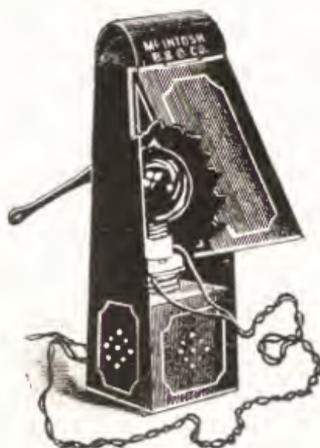
PRICE, Stand only.....	\$1.50
PRICE, Stand and Best Oil Lamp, No. 1.....	4.50
PRICE, Stand and Electric Lamp, No. 2.....	5.50

The Lecturer's Reading stand is a very useful and portable accessory for any Lecturer's outfit. It is made of japanned iron, and the book-support can be adjusted to any convenient angle or height. It is also arranged to hold our Lecturer's Reading Lamps No. 1 and No. 2, the hoods of which prevent the light from being diffused, and concentrate it upon the page of the lecture. The stand when folded is very compact.

## LECTURER'S READING LAMPS.



No. 1.



No. 2



No. 3.

No. 1. Price, Oil Lamp.....	\$3.00
No. 2. Price, Electric Lamp.....	4.00
No. 3. Price, Dark Room Combination.....	.75

We offer three styles of Lecturer's Reading Lamps. No. 1 is provided with small Kerosene Oil Lamp and Chimney. After using, a common cork screwed into the Lamp in place of burner will prevent damage by leakage. This lamp is provided with a red flash signal for signaling the operator.

Electricity is now so universal that we offer in our No. 2 lamp a hooded incandescent lamp which can be attached to the ordinary socket, and which will serve the lecturer as well or better than any other reading lamp. The amount of light may be regulated by the shade so that a considerable quantity or very small amount may be used.

The lamp is equipped with an eight candlepower incandescent bulb.

No. 3 is a low-priced and convenient oil lamp which can be used also for developing in dark-room, by using red in place of clear glass.

LECTURER'S ELECTRIC SIGNAL.



PRICE, with 125 feet flexible cord, a three cell battery and two electric lamps . . . . . \$8.00

“ extra three cell batteries . . . . . .50

“ extra electric lamps, each. . . . . .50

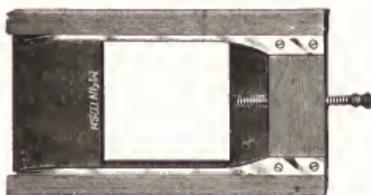
“ Clicker signals. . . . . .15

Our new signal is a great improvement over the old style. It is smaller and much more convenient in shape. The three cells of dry battery are contained inside of the reel and can quickly be replaced by any one without the necessity of making wire connections. The signal lamp is protected from danger of breakage by being enclosed in a perforated metal cap, which is a continuation of the tube which forms the center of the reel and contains the battery. The lamp and battery revolve with the reel so that rubbing spring contacts between a stationary battery and a revolving spool (used in the old style signal) are unnecessary, thereby eliminating the trouble caused by poor electrical contact.

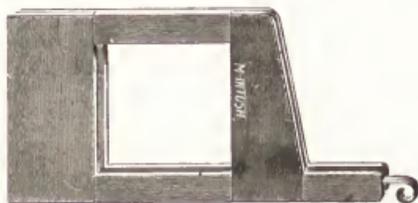
A noiseless means of communication between the lecturer and the lantern operator to indicate when the next slide is wanted is a great convenience to both lecturer and operator. Every pressure of the button held in the lecturer's hand produces a slight flash of light in the lamp near the operator.

Our new electric signal is the most compact and the best on the market.

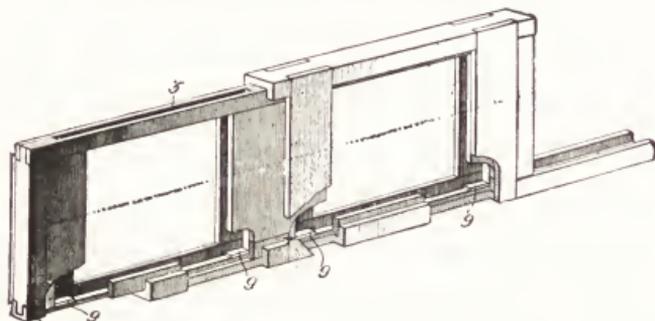
## SLIDE CARRIERS.



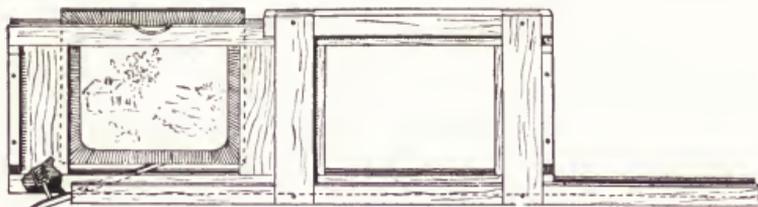
"Imperial," for Dissolving Lantern.....Price, \$ .50  
For both English and American slides.



"Self Centering," for Dissolving Lantern.....Price, \$2.00  
For both English and American slides.



"Universal" (Pat. Nov. 18, '09) for Single Lantern .....Price, \$ .75  
For both English and American slides.

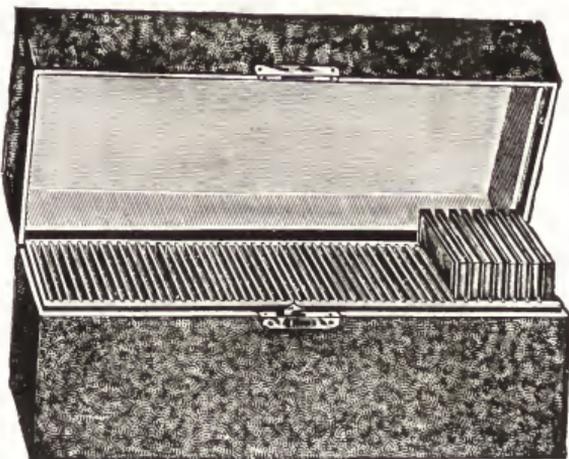


"Automatic" for single Lantern.....Price, \$1.25  
For American slides.



"Ingento Dissolving" Slide carrier.....Net, \$2.00

## LANTERN SLIDE BOXES.



PRICE.	White wood box, cloth covered, partitioned, with strong catch (see cut), capacity 50 slides.....	\$1.00
"	Same as above, but double width, capacity 100 slides....	2.00
"	White wood box, black cloth covered, divided into four compartments holding 20 each, fastened with strong catch and with strap around it and strap handle.....	1.50
"	Same as above, but with 100 slides capacity.....	2.00
"	Special shipping box, partitioned for 50 slides, padded top, bottom, sides and ends with heavy felt, good strong wooden box, covered with imitation leather, nickel fastened and trimmed.....	4.50
"	Leather Finished Case, partitioned, cover padded inside, rounded edges, leather covered handle, strong hinges, two catches, lock and key, capacity 120 slides.....	5.00

### MAKE YOUR SLIDES UNIFORM.

A trifling expense and a little trouble will remove that great annoyance of all operators, the difference in size between American and English slides. With our new cardboard slips, American size cover glass and a few binders, you can piece out your English size slides to the regulation American size also recognized as standard by the French makers, being  $3\frac{1}{4}$  inches wide by 4 inches long. Sample outfit, enough for 6 slides, 25c; postpaid 35c.

PRICE,	Cover Glass, American size, per dozen.....	\$0.20
"	Cardboard Slips, proper dimensions, per 100.....	.20
"	Binding Strips, black, gummed, per 100.....	.20
"	Mats or Masks, regulation size opening, per 100.....	.80
"	Labels, gummed, per 100.....	.10
"	Clear Gelatine Sheets ( $3\frac{1}{4} \times 4$ " ), per dozen.....	.25
"	Clear Gelatine Sheets ( $3\frac{1}{4} \times 4$ " ), per 100, net.....	2.00

### LANTERN SLIDE PLATES

PRICE, Positive or Transparency Plates, sealed.....Net, \$0.55

These prices are subject to market fluctuations.

## TABLES.



No. 1.

Table No. 1 is made of seamless steel tubing, with a special patented lifting device, so that it may be rolled about on its casters or lowered to a solid position on the floor.

A substantial 5 ply wooden shelf is furnished underneath the top shelf, which is divided longitudinally into two pieces, separately hinged, the elevation of each controlled by a separate screw. This makes it possible to set a lantern on one, elevated at any angle desired, and to have the other section nearer the operator, perfectly horizontal, to contain slides, etc.

The table is handsomely finished and is a first-class article.

PRICE .....\$20.00

In Table No. 2, we offer a less expensive table which is nevertheless, well made and durable. It has adjustable telescoping legs and is offered with or without the shelf.



No. 2.

PRICE, with shelf.....\$12.00  
 " without shelf..... 8.00

TRIPODS.

Where the Miopticon is used it is often desirable to have a tripod. The Tripod illustrated is of wood, braced and adjustable as to height. Its top is just the size to take the base of the Miopticon. If desired, a case can be furnished, drilled and tapped so that it can be set on the tripod and the Miop-  
opticon on top of the case, furnishing a shelf on which to set slides, etc.

This is frequently a desirable arrangement, although it is not as steady as the tripod without the case.



PRICE, Tripod only.....\$7.50



For use in travelling it is frequently desirable to have a tripod which has a large top. For this we offer the Gundlach Tripod as illustrated. Has a top board large enough to accommodate any ordinary stereopticon. This tripod folds up into a very compact, light weight affair for traveling. It is an exceedingly well made, substantial tripod.



PRICE .....\$12.00

## PORTABLE ADJUSTABLE EXTENSION SCREEN FRAME.



PRICE,  $1\frac{1}{2}$  inches in diameter, per section.....\$0 50

A practicable Portable Extension Screen Frame that can be adapted to all sizes of screens is a great desideratum to the traveling exhibitor. We furnish a portable sectional frame constructed as follows :

It is composed of the required number of sections, each section being three feet in length, one and one-half inches in diameter, of tough, thoroughly seasoned whitewood. Two of the end sections have a sharp-pointed brad that stick into the floor so that it cannot slip or get out of position ; the other two end sections, each have a pulley let into the body of the section through which is carried the screen rope, and is attached to a small screw-eye in the floor in a line with the face of the screer, and at the proper distance from the screen ; then two guy-ropes at each side of the screen, one extending forward and one backward, serve to hold the screen immovably in place. This device answers admirably for screens up to ten feet square. Larger screens than this require a heavier frame.

## SCREENS.

The white surface on which the picture is projected is called the screen. Any good white surface will serve. Probably the very best screen is a blank, white, smooth finished wall. Next to that is an opaque, enameled screen, mounted on a spring roller, so that it can be rolled up, out of the way when not in use, just like a window shade. The more perfectly opaque a screen is, the better its reflecting surface and this of course, is to be taken into consideration in ordering.

For travelling use, or where the expense of the other screens, makes it advisable, a good muslin screen, bound with non-elastic webbing, so as to prevent the edges from stretching and with reinforced corners, is very serviceable.

There is also the metallic finished screen which is usually impregnated and coated with aluminum and which has various names such as luminous, luminere, etc.

These metallic screens have only recently been placed on the market and have found favor with a great many people who believe that they are more brilliant than the regular white screen. Also that they show better, the details of the picture.

They are certainly excellent screens, but are not what is claimed for them by some manufacturers.

The prices of these various styles of screens follow:

Both the opaque white screens and the aluminum finished screens are quoted, mounted on a heavy, substantial spring roller, bracket and a board with screw eyes, so that it can be readily mounted on the wall or in such other way as desirable.

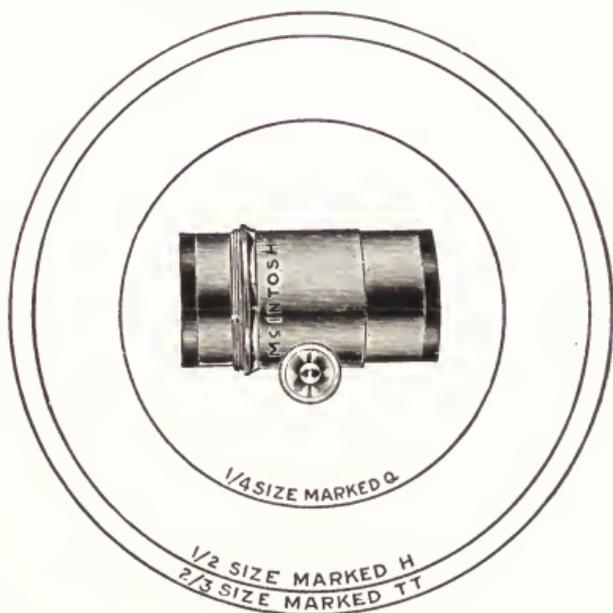
Size.	Muslin.	Opaque White.	Aluminum Finish.
6 ft. sq.....	\$ 3.00	\$ 4.00	\$ 6.00
7 ft. sq.....	3.00	6.00	9.00
8 ft. sq.....	4.00	8.00	12.00
9 ft. sq.....	4.00	12.00	18.00
10 ft. sq.....	4.50	18.00	27.00
12 ft. sq.....	7.00	20.00	30.00
15 ft. sq.....	10.00	*33.00	*50.00
18 ft. sq.....	12.00	*Made to order only.	
20 ft. sq.....	15.00	Prices of other sizes	
24 ft. sq.....	18.00	on request.	

## SCREEN ROPE.

PRICE, per skein of 100 feet.....\$1.00

We furnish the best quality sash weight cord, very strong and will not stretch.

## PROJECTING OBJECTIVES.



Our objectives are made in three sizes of mountings which are exactly the size of the three circles above. The circles correspond to the outside diameter of the inner tube or barrel into which the cells holding the glasses screw.

Objectives have for years been designated by the fractions  $\frac{1}{4}$ ,  $\frac{1}{2}$  and  $\frac{2}{3}$ , etc., indicating the size of the mounting, focus and size of the negative plate they would cover if used on a camera. To the lantern operator these fractions are fast losing their significance and should indicate simply the size of mounting, thereby eliminating much confusion of ideas, especially to the person who is trying to pick out a proper lens to meet his special requirements.

The size of a picture made by a lens does not depend on the **size** of the mounting, but upon its **focus**, and the focus is governed by the curve or shape the lens glass is ground.

To obtain the best results the **longer** the **focus** the **larger** the **objective should be**. It is also a great advantage as to brilliancy of picture when using a low power illuminant, even at a comparatively short range, to use a large objective. It is not practical to use a low power illuminant at a long range even with a large size objective.

A picture made by any objective can be increased in size by increasing the range or distance from lantern to screen. The proportion of increase, however, will vary with the focus of the objective, i. e., a picture projected with a short focus lens will increase much more rapidly with the increase of range than with a lens of long focus. With the electric arc lamp smaller objectives can be used with satisfaction than with illuminants which are less concentrated, as the focus or crossing point of the light rays in front of the condensing lenses is smaller and consequently can be taken in by a smaller lens.

### ACHROMATIC OBJECTIVES.

The objectives listed below are manufactured specially for us from our original patterns under our own name, and are guaranteed fully equal to the highest priced lenses on the market in illumination, definition, flatness of field and workmanship of mounting, and will be supplied with all our lanterns as priced.

	Name of Objective	Proportion of Projected Picture to the Range.	PRICE
<p>The letter indicates the size of the mounting.</p> <p>The number after the letter indicates the equivalent focus of the lens.</p> <p>The range is the distance in feet from lantern to screen.</p>	Q 4	$\frac{3}{4}$ of range	\$ 8 00
	Q 6	$\frac{1}{2}$ of range	6 00
	Q 8	$\frac{3}{8}$ of range	6 00
	Q10	$\frac{3}{10}$ of range	6 00
	Q12	$\frac{1}{4}$ of range	6 00
	H 8	$\frac{3}{8}$ of range	12 00
	H10	$\frac{3}{10}$ of range	12 00
	H12	$\frac{1}{4}$ of range	12 00
	H15	$\frac{1}{3}$ of range	15 00
	H18	$\frac{1}{6}$ of range	15 00
	H21	$\frac{1}{7}$ of range	15 00
	H24	$\frac{1}{8}$ of range	15 00
	TT12	$\frac{1}{4}$ of range	20 00
	TT15	$\frac{1}{5}$ of range	20 00
	TT18	$\frac{1}{6}$ of range	21 00

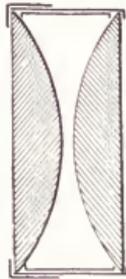
Focus of Objective in Inches.	RANGE OR DISTANCE IN FEET FROM LANTERN TO SCREEN												Approximate Size of Projected Picture in Feet.	
	10	20	30	40	50	60	70	80	90	100	110	120		
4	7½	15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6	5	10	15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
8	3¾	7½	11¼	15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
10	.....	6	9	12	15	18	21	.....	.....	.....	.....	.....	.....	.....
12	.....	5	7½	10	12½	15	17½	20	22½	25	.....	.....	.....	.....
15	.....	.....	6	8	10	12	14	16	18	20	22	24	.....	.....
18	.....	.....	5	6½	8	10	11½	13	15	16½	18	20	.....	.....
21	.....	.....	.....	5½	7	8½	10	11½	13	14	15½	17	.....	.....
24	.....	.....	.....	5	6¼	7½	8¾	10	11¼	12½	13¾	15	.....	.....

The use of a slide with 3-inch mat opening is the basis on which the above table is figured.

### DARLOT OBJECTIVES.

PRICE, Special Mount, 4 inch E. F.....	\$ 9.00
“ ¼ Mount, 6½ inch E. F.....	8.00
“ ⅓ Mount, 7¾ inch E. F.....	13.50
“ ½ Mount, 9¾ inch E. F.....	16.00
“ ⅔ Mount, 10½ inch E. F.....	24.00
“ ¾ Mount, 14¾ inch E. F.....	36.00

## CONDENSING LENSES, PLANO CONVEX, GROUND EDGES.



1½	inches	in	diameter,	unmounted,	each.....	\$ 0.75
2½	"	"	"	"	.....	.85
3	"	"	"	"	.....	1.00
3½	"	"	"	"	.....	1.00
4	"	"	"	"	.....	1.25
4⅛	"	"	"	"	.....	1.35
4¼	"	"	"	"	.....	1.40
4⅜	"	"	"	"	.....	1.45
4⅚	"	"	"	"	.....	1.50
4½	"	"	"	"	.....	1.50
4⅝	"	"	"	"	.....	1.65
5	"	"	"	"	.....	1.75
6	"	"	"	"	.....	3.00
7	"	"	"	"	.....	5.75
8	"	"	"	"	.....	7.50
9	"	"	"	"	.....	10.00
10	"	"	"	"	.....	13.50
12	"	"	"	"	.....	27.00
14	"	"	"	"	.....	40.00

### MOUNTINGS FOR CONDENSING LENSES.

The following sizes are generally used for photo-enlarging, in pairs, mounted in tin, with flange:

#### Price of Mounts for Condensers.

6	inches	in	diameter,	net	\$2.00	10	inches	in	diameter,	net	\$4.00
7	"	"	"	"	2.25	12	"	"	"	"	5.00
8	"	"	"	"	2.50	14	"	"	"	"	8.00
9	"	"	"	"	3.00						

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Special Slide Catalogs on request, as follows:

CATALOG A

Agricultural, Agricultural Extension, Animal and Poultry Husbandry.

CATALOG E

Education, Science, Art, Industry, History, Literature, Geography, Biography, Etc.

CATALOG R

Religious, Entertainment, Etc.

CATALOG G

General, Travel, Topical, Miscellaneous Entertainment.

GENERAL INDEX

OF—

LANTERNS AND THEIR ACCESSORIES

AND—

OTHER ITEMS OF INTEREST.

	PAGE		PAGE
Accessories, Alcolite.....	53	Cylinder, Key .....	66
Acetylene, Burner.....	57	"    Gauge .....	65
"    Burner Cleaner.....	58	Diagram of Lantern.....	7
"    Dissolving Key.....	58	Dissolving Key, Acetylene .....	58
"    Gas Jet.....	57	"    Oxy-hydrogen .....	61
"    Generator .....	56	Dissolving Shutter, Monarch .....	24-25
Adapters, Tank.....	66	"    Imperial .....	23
Alcohol .....	53	Edison Kinetoscope.....	34-35
Alco-lite .....	53	Electric Arc Lamp.....	50-51-52
"    Mantles.....	53	"    Lamps, Incandescent....	55
"    Supplies .....	53	"    Lens, Box.....	45
Alum, Tank .....	43	"    Signal, Lecturer's.....	69
Aluminum Screens.....	75	Errors .....	3
Amplifying Lenses.....	42	Ether .....	63
Annealed Glass Disc.....	58	"    Saturator .....	62
Approval .....	2	Fine Adjustment Support.....	52
Arc Lamps, Electric .....	50-51-52	Frames, Screen.....	74
"    "    Hand Feed.....	50	Fuses, Blocks .....	47
"    "    Ninety Degree.....	51-52	"    Cartridge .....	47
Asbestos, Covered Wire.....	46	"    Enclosed .....	47
Attachment, Adjustable slot.....	41	Gas Generator, Acetylene .....	56
"    Micrometer Stage.....	42	"    "    Economic .....	61
"    Microscope .....	42	"    "    Self Condensing.....	62-63
"    Reflecting .....	28	Gas Making Outfit, Acetylene .....	56
"    Two-Way .....	64	"    "    Economic .....	64
"    Vertical .....	44	Gauge, Cylinder.....	65
Ball Hood.....	50-51	Gelatine, Clear .....	71
Bottle, Prism.....	41	"    Colored .....	45
Batteries for Signals.....	69	Glass Cell .....	43
Blinding Strips.....	71	"    Disc .....	43
Boxes, Lantern, Slides.....	71	"    Disc Annealed.....	58
Bridge Supports, "Y".....	41	"    Tanks .....	42
Burner, Acetylene .....	57	Goose-necks .....	60
"    Cleaner, Acetylene.....	58	Guarantee .....	3
"    Alco-lite .....	53	Home Reflecting Lantern.....	27
"    Lime, Light .....	60-61	Hood, Ball.....	50-51
"    Nernst .....	51	Hose Connector.....	66
Bushings .....	66	How to order.....	2
Cable, Twin, Wire, Stage.....	46	How to ship.....	2
Carbide .....	56	Imperial Acetylene Generator....	56
Carriers, Slide.....	70	"    Stereopticons .....	20-21
Cartridge, Fuses.....	47	"    Stereopticons .....	22-23
Cell, Glass, Alum.....	43	Incandescent Lamps.....	55
Cell, Water.....	43	Interchangeable Projector.....	29
Chaser .....	45	Jets, Acetylene .....	57
Chemicals .....	63	"    Calcium .....	60-61
College Bench Lanterns.....	38-39-40-41	Key, Acetylene Dissolving.....	58
Color, Disc.....	45	"    Cylinder .....	66
Condenser, Lenses.....	10-78		
Condenser, Substage.....	42		
Cooling Tank.....	43		
Copper Lugs.....	46		
Couplings, Tank.....	66		
Cover Glasses.....	71		

	PAGE		PAGE
Key, Oxy-hydrogen Dissolving	61	Portable Sclipticon	19
Kutsch Plug & Receptacle	46	Post Card Projector	27 to 33
Lamps, Acetylene	57	Pressure Gauge	65
"    Alco-lite	53	Prism, Bottle	41
"    Arc	50-51-52	Projection Lenses, Laws of	76-77
"    Incandescent	55	Projection Microscope	42
"    Nernst	54	Reading Lamps	68
"    Reading, Oil	68	Receptacle, Plug, Kutsch	46
"    "    Electric	68	"    Stage, Kutsch	46
"    "    Comb., Dark Room	68	Regulating Needle Valves	66
Lantern Slide Boxes	71	Remitting	2
Lantern, Slide, Plates	71	Rheostats	48-49
Lantern Stands	72-73	Rope for Screen	75
Lantern Tables	72-73	Safety Projector	36-37
Lantern Tripods	73	Saturator, Ether	62
Law of Objectives	76-77	Sclipticon Imperial	20-21
Lecturer's Electric Signal	69	"    Portable	19
"    Reading Lamps	68	"    McIntosh	18
"    "    Stand	67	"    Monitor	16-17
Lenses, Condensing	10-78	"    Triumph	15
Lens Box or Chaser	45	Screens	75
Lens, Mounts	78	"    Aluminum	75
Lenses, Objectives	11-76-77	"    Frames	74
Lime Jets	60-61	"    Rope	75
Light for Projection	8-9	Self-Condensing Oxygen Outfit	62
Limes	59	Shipping Orders	2
Lime Tongs	60	Shutter, Dissolving Imperial	23
Lugs, Solderless, Copper	46	"    Monarch	24-25
Magnifying, power of objectives	77	Signal, Lecturer's Electric	69
Mail order	2	"    Clicker	69
Mantles, Alco-lite	53	Slide Boxes	71
Material for making Oxygen	63-64	Slides, Binding Strips	71
Mats for Slides	71	Slide Carriers	70
McIntosh Opaque, Projector	28-29	Slide Plates	71
"    Sclipticon	18	Slot, Adjustable	41
Micrometer Stage	42	Socket Rheostat	49
Microscopy	5	Spot Light	45
Microscope, Projecting	42	Stage, Cable	46
Miopticon	26	Stands, Lantern	72-73
Monarch Stereopticon	24-25	Stand, Reading	67
Monitor Sclipticon	16-17	Stereopticons, Imperial	22-23
Motion Picture Machines	33-34-35-36-37	"    Monarch	24-25
Mounts for Condensers	78	Substage, Condensers	42
Multiopticon	30-31-32-33	Supplies, Nernst, Lamp	54
Muslin Screens	75	Support, Fine Adjusting	52
Needle Valves, Regulating	66	"    Pin	41
Nernst Lamp	54	"    Plate Base	48-57-60
Nernst Lamp Supplies	54	"    Prism	41
Objective Microscope	42	"    Tank	43
Objectives	11-76-77	Switches	47
Opaque Projection	12-13-14	Switchboards	47
"    Projectors	27 to 33	Table of Magnification	77
"    Screen	75	Tables, Lantern	72-73
Optical Principles	7	Tank, Cooling	43
Orders	2-3	Terms	2
Outfit, Economic	64	Tips for No. 3 Jets	60
Outfit, Self-Condensing Oxygen	62	"    Acetylene	57
Oxygen Outfit, Self-Condensing	62	Tongs, Lime	60
Oxone	64	Tripods, Lanterns	73
Oxy-hydrogen Jets	60-61	Triumph Sclipticon	15
Packing	2	Two-Way Attachments	64
Pencil Ray Attachment	41	Valve, Regulating Needle	66
Plates, Lantern, Slides	71	Vertical, Attachments	44
Plug, Stage	46	Water Cell	43
		Wire Cable	46
		Wrench, Cylinder	68

GENERAL PRICE LIST OF ACCESSORIES.

Acetylene, Burners .....	\$ 6 00	Dissolving Key, Acetylene.....	\$ 5 00
" Dissolving Key.....	5 00	" " Compound or	
" Generator .....	8 00	L. P., No. 1	12 00
" Tip Cleaner.....	25	" " L. P. Com-	
Adapters, for Tank Valves,		pound No. 2	15 00
each .....	75	" " Lubricator ..	25
Adapting Rings.....	50	Dissolving Shutter, Imperial..	5 50
" Tubes, 1-3 to ½.....	1 50	Dissolving Shutter, Monarch..	5 50
Alco-lite .....	10 00	Dividing or "T" Tube.....	25
Alcohol, Denatured, per gal.,		Edison Kinetoscope.....	250 00
net .....	85	Electric Lens, box or chaser..	25 00
(Subject to market fluctua-		Ether Saturator.....	10 00
tions.)		Ether Sulph., Best Grade—Mar-	
Alco-lite Mantles, net.....	15	ket Rate.	
" Mantles, per dozen,		Extension Tube for 18 in. Ob-	
net .....	1 50	jective .....	1 00
Alum Tank, thin, all glass...	3 50	Extension Tube for 21 in. Ob-	
" Improved, large..	6 00	jective .....	1 50
Aluminum Screens, see page 75.		Extension Tube for 24 in. Ob-	
Amplifying lens, each.....	2 00	jective .....	2 00
Asbestos Wire, No. 10, per ft.,		Extension Tube for 32 in. Ob-	
net .....	10	jective .....	3 00
Attachment, Microscope .....	25 00	Forges for Gas Outfits.....	5 00
" Micrometer stage	3 00	Frames Screen, per section....	50
" Reflecting .....	33 00	Fuse Block, page 47.	
" Vertical .....	20 00	Enclosed, each.....	25
" Adj. Slit.....	3 50	Flange Rings ¼.....	50
" Two-Way .....	2 00	Flange Rings ½.....	1 00
Arc Electric Lamps, see pages		Gas Burners, Welsbach, with	
50-51-52.		attachments .....	5 00
Batteries for Electric Signals,		Gas Generator, Economic.....	16 50
net .....	50	Gas Making Outfit, Acetylene..	8 00
Binding Strips for Slides, per		" " Economic ..	16 50
100 .....	20	Gauge, McIntosh Cylinder Im-	
Bodies, College Bench.....	5 00	proved .....	\$4.00 and 6 00
" Imperial, small.....	2 50	Generator, Acetylene.....	8 00
" Imperial, large.....	5 00	Gelatine, clear, 3¼ in. by 4 in.,	
" Portable, collapsible...	5 00	net, per dozen.....	25
" Sheet Iron Monitor..	3 00	Gelatine, clear, 3¼ in. by 4 in.,	
Boxes for Slides, see page 71.		net, per 100.....	2 00
Bridge Supports, Bench or Im-		Gelatine, colored, per sheet...	20
perial .....	1 00	doz., net	1 80
Burners, Acetylene .....	6 00	Glass Disc, annealed.....	50
" Gas, Welsbach, with		" Tanks .....	\$3.50 to 6 00
attachments .....	5 00	Goosenecks, plain.....	1 00
Burners, Lime, see Jets.		Home Reflecting Lantern....	35 00
Cable, Stage, Double, No. 10,		Hoods, Ball, for Arc Lamps	
per foot, net.....	12	with Brass shields, net.....	1 00
Cable, Stage, Double, No. 8,		Hoods, Short, Steel, for Im-	
per foot, net.....	14	perial .....	75
Caps for Objectives.....\$0 75 to 1 25		Hoods, Short Steel, for Col-	
Carbons, ¾ in. and ½ in., net	04	lege Bench.....	1 00
Carbons, 5/8 in., net.....	04	Hoods, Short Steel, for Monitor	
Carbide, 10 lbs.....	1 00	Hoods, Short Steel, for Port-	
Cartridge, fuse, each.....	25	able .....	1 00
Cell, glass.....	3 50	Hose Connector.....	60
Chaser or Lens Box.....	25 00	Imperial Generator .....	8 00
Chemicals, per package, net..	75	Jet Adjustable No. 1.....	6 00
Chemicals, per dozen packages	8 50	" " No. 2.....	8 00
Chimneys, Glass Welsbach...	15	" " No. 3.....	10 00
Color Disc.....	5 00	Key Cylinder, Improved.....	60
College Bench, see pages 38-		" Dissolving, Acetylene .....	5 00
39-40-41.		" " No. 1.....	12 00
Comb. Port & C. B.....	100 00	" " No. 2.....	15 00
Condensing Lenses, see page		Kutsch Plug & Recep, net....	3 50
78.		Labels, for Slides, per hundred	
Condensing Lens sub. stage...	4 00	Lamps, Arc, Electric, Hand	
Cooling Tank .....	6 00	Feed .....	8 00
" for Imperial.....	6 00	Lamp, 2-wick, for Oil.....	3 00
Cover Glasses per 100.....	1 60		
Cover Glasses for slides, per			
dozen .....	20		
Cylinder Key, Improved.....	60		
Dissolving Carrier, net.....	2 00		

GENERAL PRICE LIST.

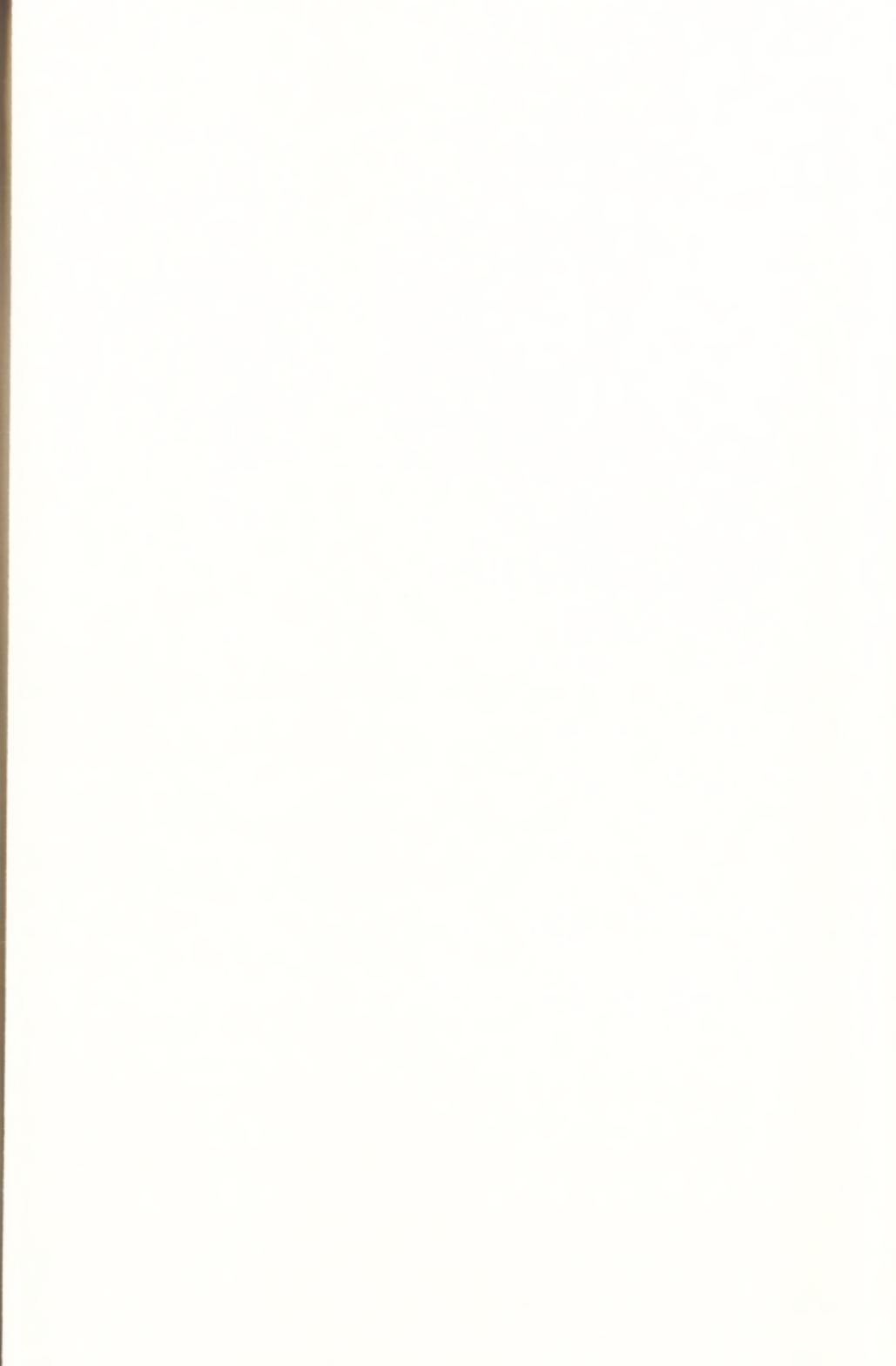
Lamps, Miniature for Signals, net .....	50	Reading Lamp Stand, Iron....	1 50
" Alcolite .....	10 00	Receptacle and Plug.....	3 50
" Incandescent Electric .....	\$3.50 to 8 00	Regulating Valve, Gas.....	2 50
" Reading, Oil.....	3 00	Retort, Iron for Self Condensing Gas Outfit.....	3 00
" Reading, Combination...	75	Rheostat, see pages 48-49.	
Lantern Plates, per dozen....	50	Rope for Screen, per 100 feet	1 00
Slide Boxes, see page 71.		Rubber Hose, Best grade, 1/4-inch, per foot, net.....	15
" Stands, see pp. 72-73.		Safety Projector.....	150 00
" Tables, see pp. 72-73.		Saturator, Ether .....	10 00
" Tripods .....	7 50	" Cores, each..	75
Lecturer's Electric Signals....	8 00	Screens, 6 Ft. Square .....	3 00
" Clicker signals, net	15	" 7 " " .....	3 00
" Improved Reading Lamp .....	3 00	" 8 " " .....	4 00
" No. 1 Reading Stand	1 50	" 9 " " .....	4 00
Lens Box or Chaser.....	25 00	" 10 " " .....	4 50
Lenses, Condensing, see page 78.		" 12 " " .....	7 00
" Objective, see pages 76-77.		" 15 " " .....	10 00
Lens Mounts, Brass, N. P....	2 00	" 18 " " .....	12 00
Limes, Regular, per dozen....	1 00	" 20 " " .....	15 00
" Single, Regular, in sealed glass tubes...	15	" 24 " " .....	18 00
Limes, Regular, in sealed glass tubes, per dozen.....	1 50	" 30 " " .....	22 50
Limes, English, in sealed glass tubes, per dozen.....	2 00	" Aluminum, see page 75.	
Limes, English, in sealed glass tubes, each, net.....	20	" Opaque, see page 75.	
Lime tongs, per pair.....	60	" Frame, 1 1/2 inch, per section .....	50
Lubricator for Dissolver, per box .....	25	" Rope, per 100 ft. length	1 00
Lugs, Solderless, net.....	10	Shutter, Dissolving Imperial...	5 50
Mantles, Alco-lite, net.....	15	" Monarch ..	5 50
" dozen, net..	1 50	Signal, Clicker .....	15
Mats for mounting slides, per 100 .....	80	" Electric .....	8 00
McIntosh Opaque Projector, see pages 28-29.		Slides, plain, each net...\$0.25 to	1 40
Microscope attachment for College Bench Lantern.....	25 00	" statuary, each .....	75
Miopticon .....	35 00	" colored, unmounted.	
Monarch Stereopticon, see pp. 24-25.		" each, net .....	\$0.50 to 1 00
Motion picture machines, see pages 23-34-35-36-37.		" colored, round, wood mounted, each net...	1 20
Mounts, Brass, Nickel-plated, 4 1/2 inch.....	2 00	" Microscopic, per dozen..	4 00
Mounts, Brass, Nickel-plated, for College Bench, net.....	1 00	Slide carriers, Imperial, each..	50
Multiopticon .....	140 00	" " Ingento, dissolving, each, net .....	2 00
Needle Valve, Double.....	5 00	" " Universal .....	75
" Regulating, per pair .....	5 00	" " Self-Centering, each .....	2 00
Nernst Lamp .....	10 00	" " Rapid, each....	50
Nipples, for Fitting on to Cylinder .....	60	" " Automatic .....	1 25
Objectives, Microscope Projecting, see page 42.		" Plates, per doz, net.....	50
Objectives, Stereopticon, see page 77.		Stands, Lantern, see pages 72-73.	
Opaque Projector, see pages 27 to 33.		Spindle for Needle Valve.....	50
Opaque Screen, see page 75.		Spot Light.....	25 00
Oxone, per box, net.....	1 35	Stage Cable, per foot, net .....	\$0.12 and 14
Pencil Ray Attachments.\$2.00 &	3 50	Stopcocks for Lime Jets.....	1 00
Plates, Lantern, Slide, per doz.	50	Supports, Bridge .....	1 00
Post Card Projector, net.....	35 00	" Cooling Tank, Imperial .....	1 00
Prism, Bottle.....	4 00	" Pin .....	25
Projecting Microscope .....	25 00	" Plate Base.....	50
Reading Lamp, Oil.....	3 00	" Prism .....	75
" Electric .....	4 00	" Fine adjustment....	5 00
" Combination ..	75	Switch Boards, see page 47...	
		Switch and Fuse	
		Combination .....	\$1.25 and 2 00
		Tables, Lantern, see pages 72-73.	
		Terminal Lugs for Asbestos Wire, net.....	10
		Tips for Lime Jet, No. 3, net .....	50
		" Acetylene Jet.....	50
		Tripods, Lantern.....	7 50
		Two-Way Attachments.....	3 00
		Valves, Double Needle.....	5 00
		Vertical Attachment.....	20 00
		Welsbach Gas Burner, with Attachments .....	5 00

















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