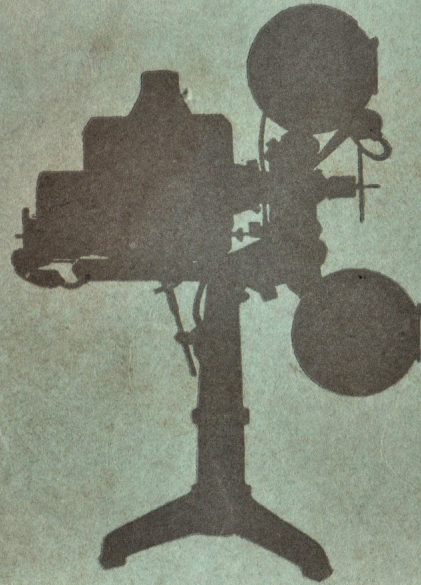


ROSS




PROJECTOR

F.C. MODEL

THE ACME
OF OPTICAL
PERFECTION &
ENGINEERING
PRECISION



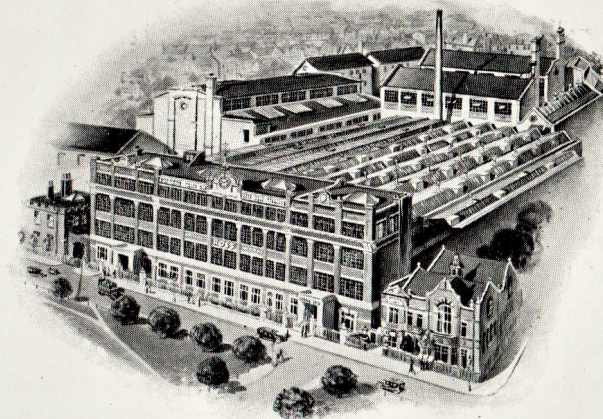
ROSS LTD



Opticians to
H.M. The King



Opticians to His Majesty The King



ROSS LTD.

OPTICAL WORKS

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SHOW ROOMS

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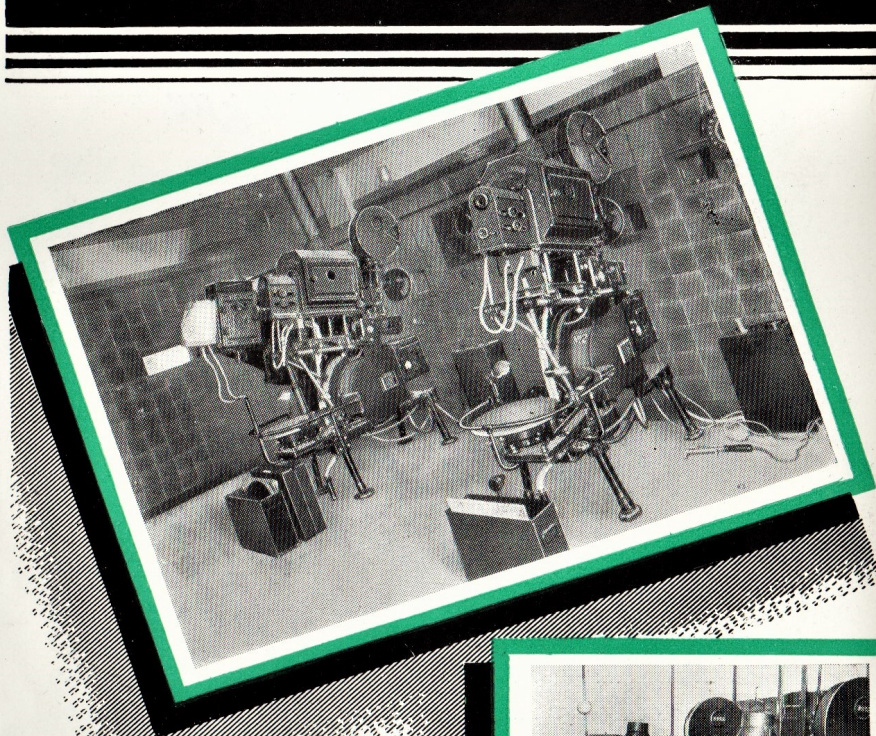
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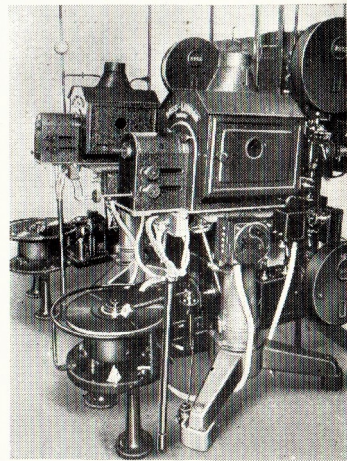
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Typical Ross

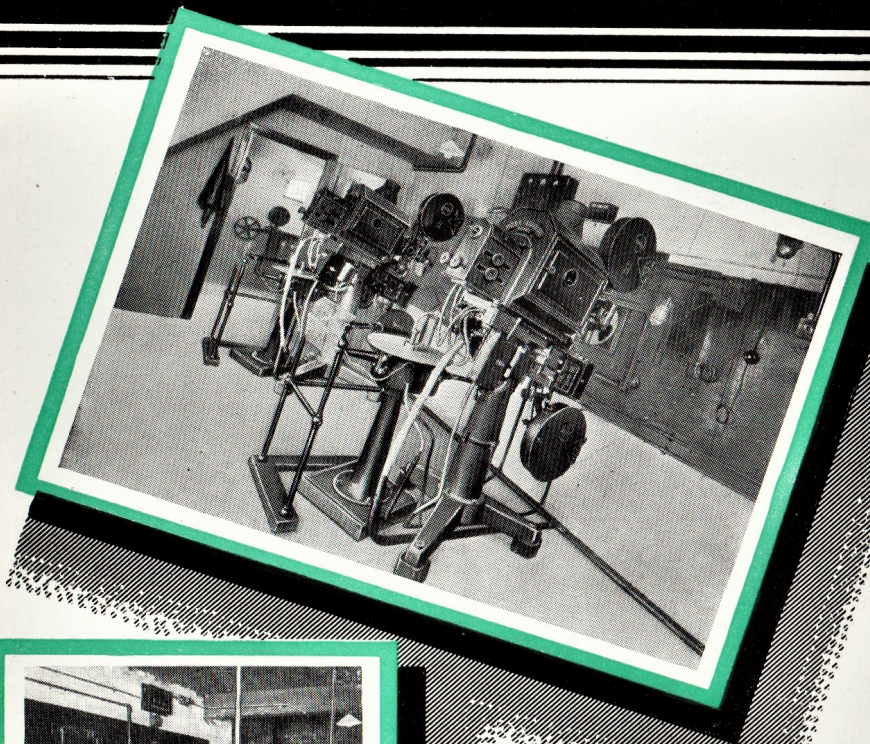


Corner of Operating Room, Ritz Picture House, Edinburgh, with Ross Projectors and Western Electric Sound Equipment.

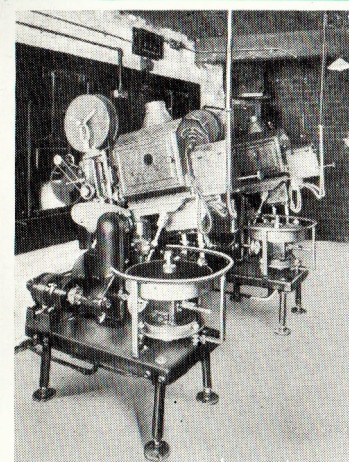
Corner of Operating Room, East Park Picturedrome, Northampton with Ross Projectors and Picture-tone Sound Equipment.



Installations



Corner of Operating Room, The Regal, Watford, with Ross Projectors and R. C. A. Photophone Sound Equipment.



Corner of Operating Room, The Apollo, Birmingham, with Ross Projectors and B.T.H. Sound Equipment.



One of the shops in which Ross Projectors are made.

INTRODUCTION

THE ROSS F.C. MODEL PROJECTOR

GREAT progress has been made in many branches of the Cinema World to-day.

To realise this one has only to look back a little while and think of the conditions which prevailed then in the presentation of a cinematograph entertainment.

The whole technique of Picture Production has advanced with wonderful strides.

Architecture, and the whole art of cinema construction and internal decorative schemes have advanced enormously, as is evidenced by the exquisite structures of the present day.

New stars, huge producing companies, great technicians and fine orchestras, all contributing to a state of perfection, have brought the cinematograph entertainment to its envied position of being the most popular form of entertainment.

New ideas are continually being brought forward by the various sections, and the best that can be done for the advancement of the industry is being done.

The importance of the Art of Projection outweighs that of all the other sections of the industry. It is the final governing factor which displays to the public the combined efforts of all the people concerned with the production.

Expert projection is of direct value to the box office and the prestige of the theatre ; indeed, the Projection Room is not inaptly termed the "Heart of the Show."

The projectionist, however expert and careful he is, cannot be expected to do justice to the presentation of the entertainment if he has not at his command the highest class of equipment. The public, becoming more and more critical as time goes on, demand the best, and the industry is untiring in its efforts to give them the best ; and the slogan of those who sell the entertainment to the public should be "Only the Best Will Do."

ROSS LTD., since entering the field of the manufacture of Projection Equipment, have done a great deal towards perfecting the art of projection, and have proved themselves to be the leading authorities in this class of work. Their products have won universal appreciation, and have found their way into all corners of the world.

This is largely due to the untiring research work continually going on at their wonderful works at Clapham Common. Coupled with the march of progress and the rapid installation of Sound Producing Systems into many cinemas, Ross Ltd.

have introduced a New Model Projector, the F.C. Model. The design and construction of this machine are such that the F.C. was at once accepted as the best and most efficient for all Sound Producing Systems now in use.

It possesses all the fine qualities demanded in a modern projector, is of British manufacture throughout, the hall mark of strength and durability, giving unfailing service and complete satisfaction.

The answer to the problem of perfect projection is a Complete Ross Installation. The Ross F.C. Projector, Patent High Intensity Searchlight Arc Lamp and D.P.L. Projection Lens, are in combination the best that money can buy.

PROJECTOR MECHANISM

DESCRIPTION

THE application of the fixed optical centre system, which is most desirable in a projector, has been adhered to, and the same famous principle as incorporated in the D.C. Model is in use on the F.C. The gate aperture and the projection lens in its rigid mount are each fixed to a cylindrical bar directly in line with one another, while the mechanism which carries the upper feed sprocket, the intermittent sprocket, and the lower or take-up sprocket, and film track with pressure springs, is arranged on a framework which slides smoothly up and down between these two cylindrical bars.

It is by such movement that the masking of the picture is accomplished while the requisite loops above and below the gate remain therefore of constant length, no allowance having to be made in their length for racking.

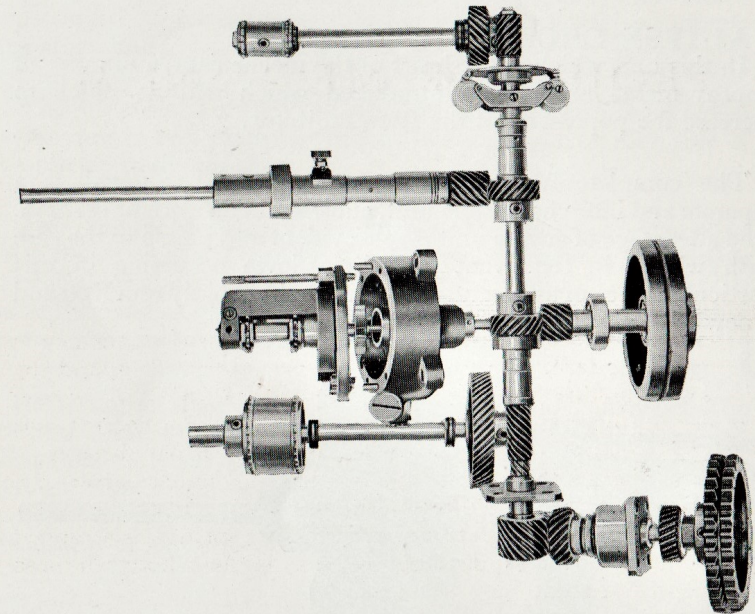
It will be seen that the passage of the film through the gate is constant and that there is no pulling of the film through the gate when racking, since when an alteration to the racking movement is made the film track travels with the film itself.

The racking pinion is located on the bottom of the left-hand pillar and the movable frame mentioned above is carefully balanced by a strong spring so that by a slight turn of the racking pinion it is easily moved through the distance of about one complete picture.

Provision is made for keeping this movement smooth by maintaining a perfect fit of the frame upon the steel pillars, with the aid of pressure pads which are adjustable.

Stops are also provided at the top and bottom of the mechanism to restrict the movement of the frame to the amount necessary.

This principle of the application of a fixed optical centre is admitted to be the highest form of practice in projector construction.



An entirely new train of gearing, of the spiral type, has been adopted throughout the mechanism.

This is not only found to be quiet in use when new, but it has that property of becoming more silent as it becomes worn in.

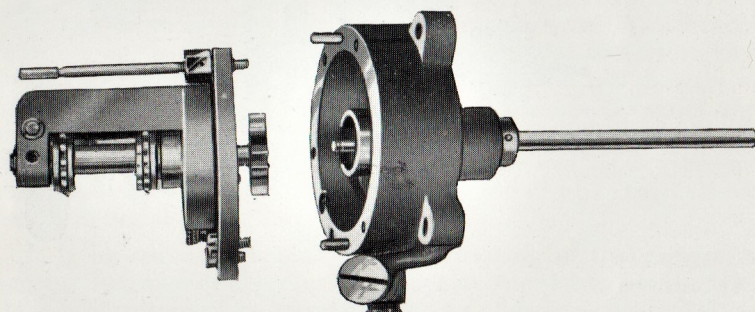
Noiselessness in operation is a great achievement on any projector, and while carefully manufactured spur and bevel gearing can be made to run remarkably quietly, practice has revealed that spiral gearing is superior, and Ross Ltd. for this reason have applied this system to their F.C. Model. Feed sprocket, shutter spindle, flywheel and Maltese Cross spindle and lower sprocket, are all actuated by spiral gearing from a stout vertical spindle which is driven by a spiral gear from the chain wheel.

This gearing is cut in the most exacting manner by special machinery under the care and supervision of highly skilled engineers.

MALTESE CROSS

In this unit which is the heart of the mechanism, a number of improvements have been introduced which will do much to increase the popularity of the Ross Projector.

The complete Maltese Cross movement is arranged as a separate and interchangeable unit, enclosed in an airtight oil bath. The advantage of such a unit is self-evident and points to the ease with which, in the event of a breakdown occurring in this particular piece of apparatus, the unit can be rapidly removed and a new one substituted.



All that is necessary to change a unit is to remove the gate from the sliding frame and take out the four screws by which the cross box unit is attached to the frame, uncouple the flywheel from the cam-spindle by undoing the set screws which attach it to the shaft, and withdraw the whole unit.

A new unit can now be inserted, and the timing of the shutter readjusted. The whole operation can be done in a remarkably short space of time. The cam of the movement is constantly revolving in oil, and by splash lubricates the Maltese Cross itself, its spindle, and the cam spindle. Efficient lubrication is guaranteed complete when the cross box is kept full of oil.

A special air valve is attached to the box which is released by simply unscrewing a small milled lever located behind the intermittent sprocket. This allows the box to be easily filled with oil by the aid of the metal syringe supplied with each mechanism. The release of this valve also allows easy drainage of the box after the drain plug is unscrewed.

The Maltese Cross is made in one piece with its spindle and is constructed of oil hardened chrome vanadium steel accurately machined and ground by a special process.

The dimensions of the cross are optically tested for squareness and it runs in two phosphor bronze bearings, one on each side of the intermittent sprocket.

This double bearing is an important feature of the Ross Projector, and it will readily be understood that it is impossible for that length of spindle on which the intermittent sprocket fits to be thrown out of truth, so as to cause an oscillatory movement to the intermittent sprocket itself.

Adhering to their usual practice the centre distance between the cross and cam has not been made adjustable. The perfect adjustment of this piece of mechanism is so essential and so delicate that it can be done correctly only at the works of the machine makers. The method employed ensures absolute steadiness of picture combined with silence in running.

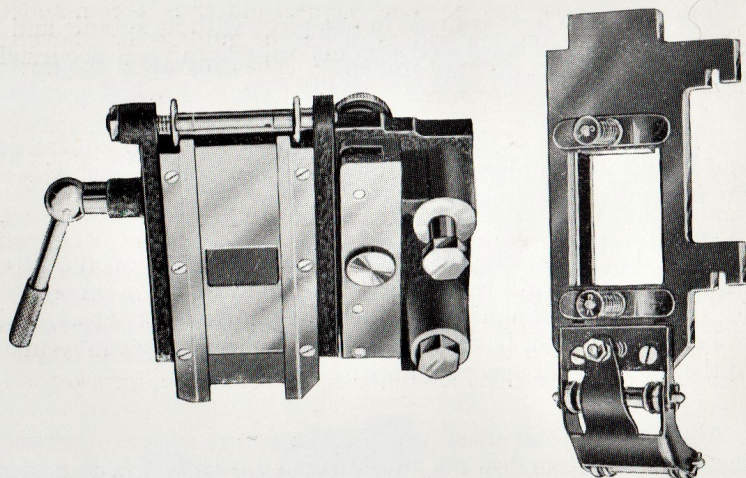
The striking pin of the cam actuating the Maltese Cross is fitted with a hardened roller, thus converting the sliding friction of the pin into a rolling one as it engages the slots of the Maltese Cross. The result of this is decreased friction and increased life to the Maltese Cross movement.

INTERMITTENT SPROCKET.

The intermittent sprocket is manufactured from the finest tool steel carefully hardened and tempered. Specially designed machinery is used for grinding the teeth, thus ensuring perfect balance and truth. Wear and undercutting of teeth are negligible, and consequently damage to the film is avoided.

All sprockets before leaving the factory are optically tested for accuracy of spacing, so as to conform with the standard of film dimensions.

The attachment of the sprocket to the spindle is made by two set screws so arranged that it is impossible to bend the spindle during this operation.



GATE.

Embodying the new and improved arrangement for the fixed optical centre, the gate of the F.C. Model is a special feature.

The gate aperture is attached to a light cone of special design which in turn is attached to one of the upright pillars of the machine in such a position as to bring it directly in line with the projection lens which is fixed to the other pillar.

Inside this light cone is arranged a ribbed and flanged inner cone which is not in direct contact with the gate aperture, and is formed in such a manner that all stray light coming from the searchlight arc strikes these successive ribs and leaves the gate aperture insulated from heat to a remarkable degree.

The effective beam of light passes directly to the film and the efficient illumination of the film is ensured.

This feature is patented, and has proved itself most effective in keeping down the temperature of the film.

The film track is arranged by two hardened steel runners let into the gate in such a manner that they are easily interchangeable when they become worn.

The film track has no side flanges and thus accommodates films of slightly varying widths, while the guide roller above the gate is split and one-half of this roller is bearing upon the film by very tender spring pressure.

Most projectionists will have noticed the bad effect upon the screen which films of different widths have, and will readily understand that warping of the film during its passage through the gate, and consequent fluctuation of focus cannot occur with this machine. The new method of construction, making the film track a portion of the sliding frame, together with the intermittent and other mechanism, has enabled the intermittent sprocket to be placed quite close to the gate and immediately below it since the distance between the gate and sprocket is no longer variable.

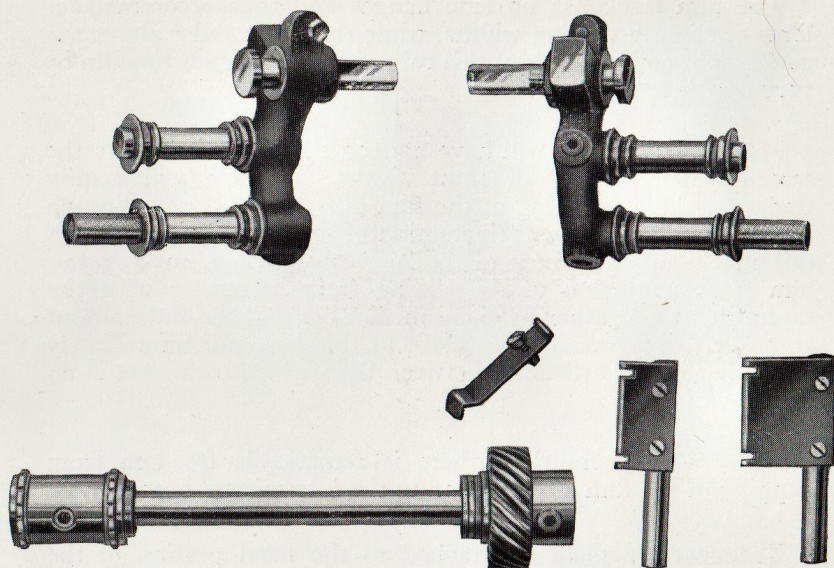
Under these conditions there is remarkable freedom from flapping of the film as it runs on to the intermittent sprocket.

The aperture plate is attached to the fixed portion of the machine carrying the light cone, while the gate aperture is of the usual standard dimensions and can be easily removed for the purpose of substituting an aperture of any other size.

For the purpose of threading up the film the gate is opened by means of a lever carrying an eccentric cam which presses against the gate when the lever is turned in a clockwise direction. This movement pushes the gate away from the film track, but the gate remains parallel to it throughout the movement and is kept open by the cam when the lever is turned to its limit.

The space between the film track and gate when open is about five-eighths of an inch. This allows ample room for the purpose of negotiating the film over the track and intermittent sprocket when threading up. In addition to this the gate itself is easily removable without the use of tools, and this facilitates the perfect cleaning, and removal of the hard deposit of emulsion which sometimes accumulates upon the film track and gate shoes.

During opening, the gate is guided by a long cylindrical bearing and two flat bearings which prevent it turning from its proper position. The pressure skates which are of thin hardened steel are held down upon the film by spiral springs, the tension of which can be adjusted.



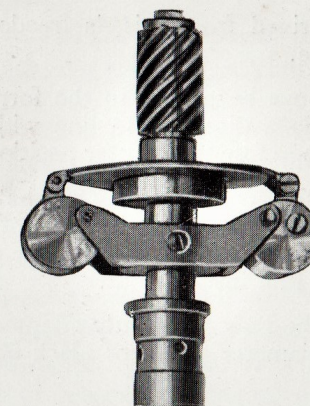
FEED SPROCKETS.

The top sprocket is a four picture one, while the bottom one is an eight-picture sprocket to which the handle for the hand drive is attached. Both of these are driven in a clockwise direction. The roller brackets which hold the film upon the sprockets are adjustable and of a new design set in such a manner as to avoid the rollers actually bearing upon the film. A sufficient clearance between sprocket and roller is allowed to facilitate the passage of even exceptionally thick or buckled joints without lifting the roller.

The rollers are flanged : this and the design of the brackets in the Ross machine ensures freedom of stoppage through film trouble.

Strippers are fitted to both feed sprockets as likewise to the intermittent sprocket, so making it impossible for the film to wrap itself round any of them.

Feed sprockets are cut from specially hardened bar steel, and freedom from undercutting is assured in addition to long life.

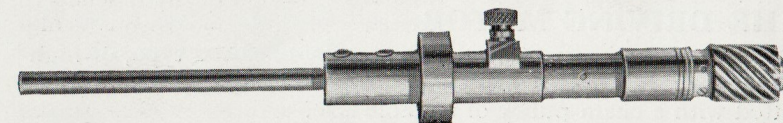


AUTOMATIC CUT-OFF.

The mechanism for this is of a new type controlled by the governor system renowned for its efficiency. It is unhesitating in its action and rises promptly when the machine reaches a safe speed, and falls rapidly when the machine slows down to a speed which is below the margin of safety.

The cut-off itself slides up and down in a slotted carriage situated immediately behind the gate, and is actuated by a lever system attached to the governor mechanism which receives its impetus from the main vertical shaft to which it is attached at the upper end.

An automatic cut-off which is positive in action is of vital importance to any projector. The cut-off of the Ross projector amply complies with the fullest requirements demanded of such apparatus.



SHUTTER AND SHUTTER DRIVE.

The shutter spindle driven by spiral gearing from the vertical shaft runs in an exceptionally long bearing of phosphor bronze with ball thrust bearing.

The advantage derived from this is freedom from "whip" together with long life.

The phosphor bronze bearing is in the form of a long bush which is adjustable in a direction in line with the axis of the shutter spindle and therefore the shutter position.

This means that the actual masking of the shutter is under control while running, and the least trace of "ghost" can be removed during a performance if found to be due to inaccurate shutter setting in the first instance.

The shutter is of the now frequently adopted (90)—(90) two-blade type of large diameter, made of black fibre well balanced and durable.

FOCUSSING.

A great asset to all projectionists is the focussing arrangements embodied in the Ross F.C.

The D.P.L. lens renders such sharp and crisp definition over the entire field that it demands a mount which is rock steady while the sleeve holding the lens can be moved slowly and deliberately to and fro.

Indifferent focussing with the D.P.L. lens becomes quickly noticeable on the screen, but once the lens is roughly focussed and secured firmly in the jacket by the clamp, both lens and jacket can be moved through the fraction of an inch by means of the focussing lever which moves over an angle of 90 degrees.

The Ross focussing mount is perfectly rigid and cannot tremble owing to vibration at high speed.

THE DRIVING MOTOR.

The motor used by us is of the totally enclosed type, of high efficiency, robust in construction, and of ample power. It is fitted with a chain pulley of suitable size.

The drive from motor pulley to projector is by a silent chain.

The motor is mounted on a bracket bolted to the pedestal of the machine in such a position that the motor pulley is in line with the centre on which the table top is tilted for different projection angles and by this means the chain tension remains constant for all angles.

MAIN DRIVES.

Most of these have already been mentioned, but it will serve a useful purpose to follow the train right through.

From the motor pulley the drive is taken to the projector pulley and main driving spindle which is geared up to the vertical shaft by spiral gearing; the vertical shaft by spiral gearing again actuates the flywheel which is of the heavy type machined all over.

The spindle to which the flywheel is attached is hollow to allow the cam shaft from the Maltese cross box to pass right through it to the extreme end of the flywheel; here it is attached to the flywheel by means of setscrews engaging with flats on the cam spindle.

The vertical shaft is held in two long phosphor bronze bearings, one with a ball thrust, making vertical play impossible.

Firmly attached to the shaft by means of set screws are the following gears:—Starting from the upper end, the top sprocket gear, governor system for the automatic cut-off, spiral gear driving the shutter spindle and spiral gear of the Maltese Cross and flywheel, the bottom sprocket and the main spiral gear connecting up the vertical spindle to the driving pulley.

Proper provision is made for oiling at all points, and the mechanism at this side of the machine is enclosed by cast aluminium covers which are very practical in keeping out the dust and grit from the gearing. It is not necessary to remove these covers for the purpose of oiling, as copper tubes are brought to the exterior of the covers from the bearings, and the tubes are fitted with oil cups with spring covers, thus assuring that no grit collects in the tubes and is washed down to the bearings after oiling.

The take-up is by chain of chain wheel, being driven from the main driving spindle. It drives the lower spool box spindle through an efficient leather washer friction drive, adjustable for various tensions by variable spring pressure.

The F.C. Model has been designed with the minimum amount of gearing and many of the gears, being of the same type and size, tend towards easy replacement as well as standardisation.

SPOOL BOXES.

Spool boxes of ample size have been provided; they are 16ins. in diameter and allow plenty of room for a 14in. spool.

The upper spool box is fitted with a window back and front which enables the operator to see when a reel is nearing the end without having to open the spool box door.

The fire traps on both boxes are formed by case hardened steel channels with free moving rollers at each end.

They are not of the hinged type and therefore cannot be left open, the film when being threaded is merely pushed into the narrow open side facing the operator.

The traps have been tested and are found to comply with the regulations in a very efficient manner, the flame being snuffed when the film has burnt down to the mouth of the trap.

The spindle of the upper spool box is fitted with a flange and guide pin to which the spool is attached; the spindle therefore revolves with the spool, which cannot overrun or turn over in a jerky manner because it is held lightly back by spring pressure to the spindle from the rear side of the spool box.

THE STAND.

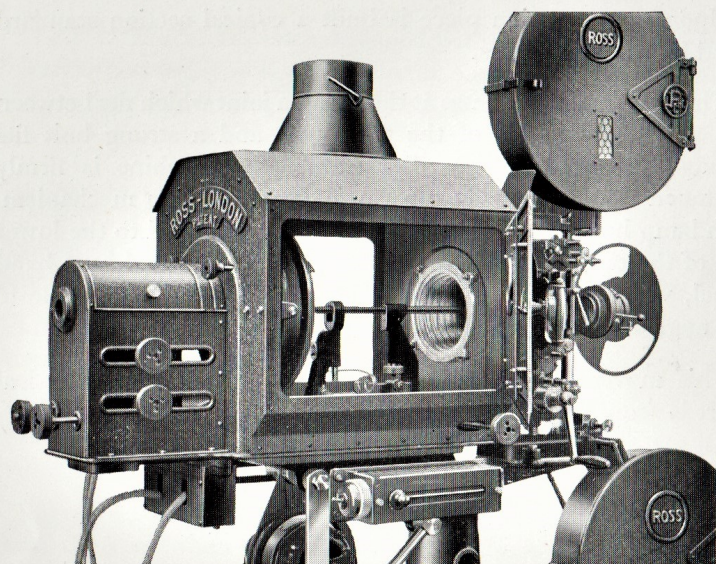
The stand is a departure from the usual lines of projector support. A very large and deep tripod casting forms the foot upon which the rest of the stand carrying the mechanism and lamp house, etc., is built up.

Next to this comes the extension piece of cast iron in varying sizes ranging from 4ins. to 16ins. in height by steps of 4ins. These extension pieces are all interchangeable, and are made thus for the purpose of adjusting the height of the machine to correspond with any angle or height of projection aperture.

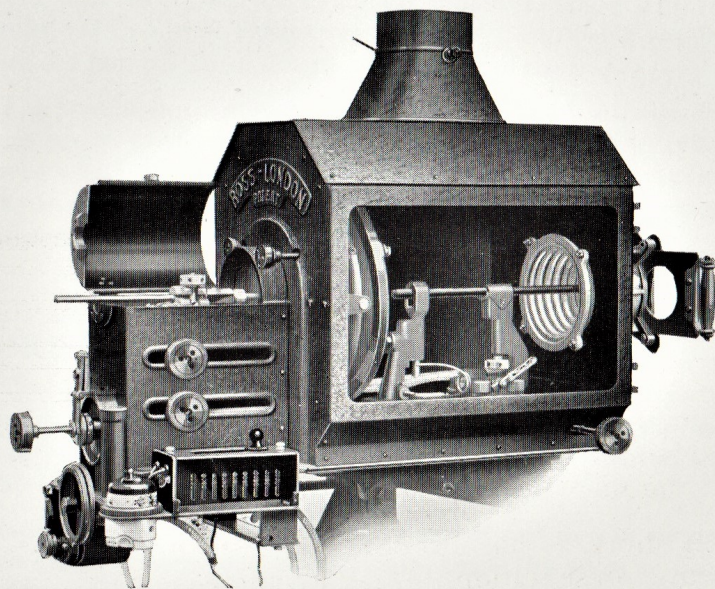
Upon the extension piece is built a conical section standard fitted by means of bolts.

This standard terminates at the top in a joint which fits between two parallel members of the table top, and a strong bolt fits through this joint which after setting the machine is firmly tightened up. The table top carries the complete mechanism, with lamp house and lower spool box, and is joined to the lower end of the conical standard by a large screw actuated by a hand wheel, which constitutes the mechanism for tilting the table to any angle at which it may be required to be set.

This movement is gradual and sure, and no other physical effort is required to alter the angle of tilt.



Ross High Intensity Searchlight Mirror Arc Lamp.



Ross High Intensity Searchlight Mirror Arc Lamp with automatic control.

INTRODUCTION

ROSS PATENT HIGH INTENSITY SEARCHLIGHT ARC LAMP

THE world's finest Projector Lamp is a truthful tribute in a very few words to the Ross Searchlight Arc Lamp. Its strong construction, perfect mechanism, and economy in operation make it one of the greatest assets to projection equipment yet introduced.

The problem of efficient illumination of the picture without the attendant drawbacks of heat and waste, has been conquered, and the unique design of the lamp is the outcome of careful optical calculation and mechanical experiment.

The Ross High Intensity Searchlight Arc has made obsolete the vertical type of arc and condenser, and the many earlier types of mirror-arcs.

In short, it has brought new life to the art of picture presentation. The advantages of this new lamp are manifold. With ordinary carbons and a current density of 20 to 30 amps, one is assured of

the emission of a steady white light easily equalling that given by an upright arc consuming 70 to 90 amps. and by far surpassing it in the quality of even distribution over the screen surface.

Loss of light due to absorptions by the old condenser system which in some cases has been known to reach the alarming proportion of 20 per cent. is entirely done away with. The saving effected in Carbons and current consumption, coupled with the highly satisfactory results on the screen, defrays the initial cost of the lamp in a very short space of time.

Fog and smoke, the deadly enemies of the projectionist, may be forgotten, for in cases of heavy fog or exceptionally dark prints one can instantly revert to High-Intensity Carbons, and by using an increased amperage, a brilliant and most penetrating light is obtained.

The Searchlight Arc with High Intensity Carbons is generally run at 70 to 80 amps, and can be used up to 100 amps. It is remarkable to note that even under these conditions of high amperage, by virtue of the sound and special construction of the lamp house the temperature at the gate aperture is not excessive.

The famous Ross D.P.L. Projection Lens, specially computed to work in conjunction with the Searchlight Arc, completes the equipment with 100 per cent. efficiency.

Patrons with increasing interest demand good entertainment from the cinema, coupled with perfect projection.

ROSS LTD. can solve projection problems in a manner which will guarantee to your patrons perfect satisfaction.

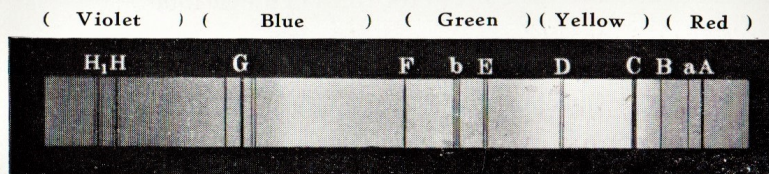
ROSS SEARCHLIGHT ARC

GENERAL DESCRIPTION AND HINTS ON OPERATION

THE Ross High Intensity Searchlight Arc which is fully patented and now in universal use was designed to meet the requirements of the projection room in a manner which provides for efficient illumination of the picture under all conditions.

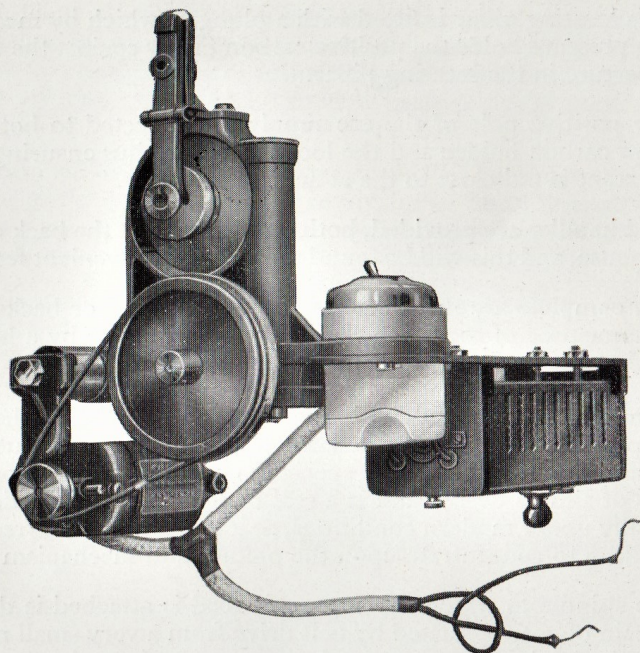
The results which can be obtained by judicious use of the lamp are unapproachable by any other type of lamp.

The discovery that the radiation emitted by cerium loaded carbons (commonly called high intensity carbons) is very much richer in the blue end of the spectrum, and considerably poorer in the red end of the spectrum as compared with ordinary carbons, led to the construction of the High Intensity Searchlight Lamp, and to obtaining a very marked increase in light without increase in heat. Beyond the red end of the spectrum comes what is known as the infra-red region, which is composed of invisible heat rays ; therefore the less radiation emitted from the red end of the spectrum the less heat will be generated.



The High Intensity Lamp was originally designed purely for the purpose which its name implies, but it has been found that low current consumption is desirable and of importance in some instances. In such cases the lamp used with ordinary carbons and a current density of 20 to 30 amps., with a voltage of 50 to 55 across the arc-terminals produces an efficiency of illumination unequalled by any other arc used as low intensity.

The lamp house is constructed of sheet steel with double walls for the purpose of securing adequate and correct ventilation.



AUTOMATIC ARC CONTROL.

There are several types of automatic control on the market to-day, but the simplest in design of all is the Ross, which is fitted as an extra for the sum of £20.

This takes the form of a train of gears actuated by spring belt drive from a very small motor which receives its current from the arc lamp terminals through a variable resistance.

The complete mechanism is fitted externally to the rear compartment of the lamp house and the arc driving gear is fitted direct to the spindle, which ordinarily carries the rear feed handle.

In order to hand feed the lamp for any particular purpose, the functioning of the automatic is easily stopped for a moment by throwing out of mesh two small gears of the ratchet type, and in addition to this, any degree of speed can be applied to the auto-feed by manipulation of the variable resistance.

Further to this it will be noted that since the motor of the apparatus is dependent upon the arc circuit for its supply, any variation in the length of arc gap, which may be due to a faulty carbon, is automatically adjusted by the fluctuation of voltage, and consequent increase or decrease of the speed of the motor.

The automatic arc feed is a necessity to a projectionist under modern conditions, and the Ross will be found to excel on account of its extreme simplicity and efficiency.

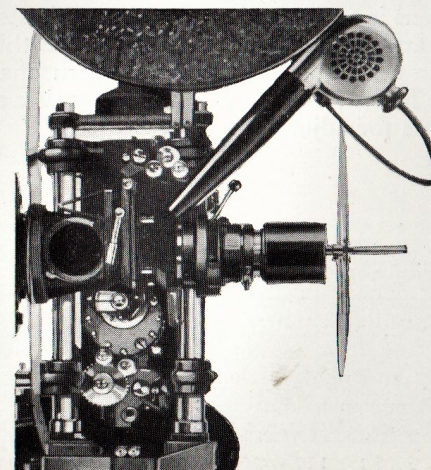
Under correct supply conditions an arc gap of $\frac{1}{4}$ in. is recommended, and the speed of the auto-feed should accordingly be set to maintain this distance as near as possible.

COLD AIR BLOWERS.

An additional refinement now available for attachment to the Ross projector is the cold air blower, which can be fitted at the low extra cost of £4 each machine.

This piece of apparatus, which is of very simple design, and is attached to the upper spool box, consists of a small motor-driven fan somewhat similar in construction to that of a hair-drying machine.

The cooling air current is directed upon the gate by a nozzle, as seen in the accompanying photograph.



The dual effect of this piece of apparatus is that it keeps the gate and film constantly cool, and is most effective in positively preventing the spread of fire beyond the gate.

Actual tests have proved that the combustion of film is greatly delayed in case of a sudden jam occurring in the film track, and that fire in such instance is entirely confined to the gate aperture, meaning that only one exposure is destroyed.

No better explanation than this is necessary to emphasise the extreme value of such a piece of apparatus, and the increasing demand for the attachment of blowers proves their worth.

It is only necessary to state voltage of the circuit from which it is intended to run the blowers, when ordering, as these blowers are designed to operate on A.C. or D.C., and the current consumption is almost negligible.

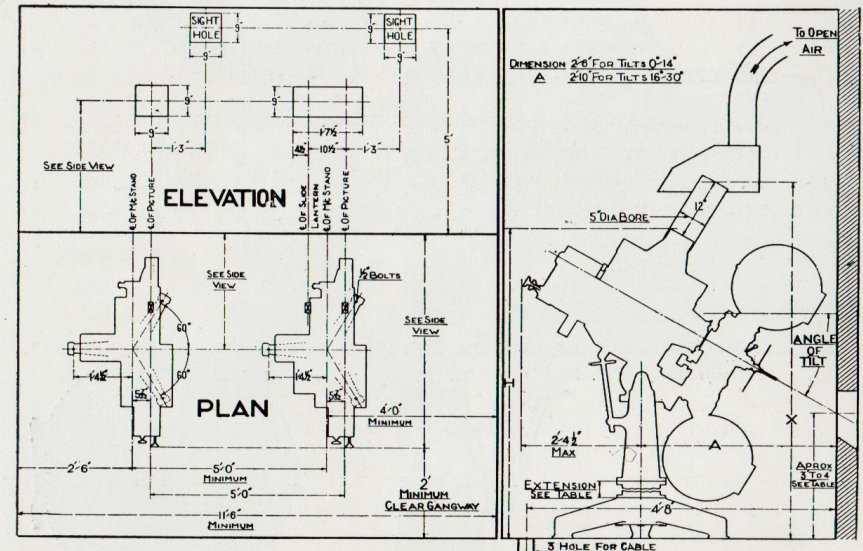
OPTICAL LANTERN.

The Ross High Intensity Searchlight Arc Lamp is not constructed for the purpose of projecting lantern slides. Provision, however, is made for lantern slide work by the attachment of a small lantern to the side of the searchlight lamp.

This is steadily supported on a bracket, and the slide carrier is made to operate vertically instead of horizontally.

The lantern lens is supported on an adjustable steel arm which carries the rack and pinion focussing jacket, and this steel arm is firmly held in an arm attached to the actual mechanism casting. The lantern is efficient, and the source of light is a small arc with ample movements for adjustments.

SPACE REQUIRED FOR 2 ROSS PROJECTORS WITH ONE SLIDE LANTERN



		CENTRE OF PORT HOLE FROM FLOOR																H		X	
ANGLE OF TILT	0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	0°	14°	30°	0°	16°
0' EXTENSION	34 1/8	33 1/2	32 3/8	31 3/4	30 3/4	29 1/2	28 1/2	27 1/2	26 1/2	25 1/2	24 1/2	23 1/2	22 1/2	21 1/2	20 1/2	19 1/2	54	41 1/2	5 3/8	5 3/8	5 3/8
4' —	38 1/8	37 1/4	36 1/8	35 1/4	34 1/4	33 1/4	32 1/4	31 1/4	30 1/4	29 1/4	28 1/4	27 1/4	26 1/4	25 1/4	24 1/4	23 1/4	58	53	6 1/8	6 1/8	6 1/8
8' —	40 1/8	39 1/4	38 1/8	37 1/4	36 1/4	35 1/4	34 1/4	33 1/4	32 1/4	31 1/4	30 1/4	29 1/4	28 1/4	27 1/4	26 1/4	25 1/4	60	57	6 3/8	6 3/8	6 3/8
12' —	44 1/8	43 1/4	42 1/8	41 1/4	40 1/4	39 1/4	38 1/4	37 1/4	36 1/4	35 1/4	34 1/4	33 1/4	32 1/4	31 1/4	30 1/4	29 1/4	64	51 1/2	6 7/8	6 7/8	6 7/8
16' —	48 1/8	47 1/4	46 1/8	45 1/4	44 1/4	43 1/4	42 1/4	41 1/4	40 1/4	39 1/4	38 1/4	37 1/4	36 1/4	35 1/4	34 1/4	33 1/4	68	63	7 1/8	7 1/8	7 1/8



**F.C. Model with Aluminium Lamp House
and Vertical Arc**

THE ROSS PROJECTOR F.C. MODEL WITH VERTICAL ARC LAMP

Ross F.C. mechanism.
 16in. top and bottom spool boxes of steel blacked.
 Six 13½in. steel film spools.
 Ross vertical arc lamp six movement.
 Set of condenser lenses (heat proof) in mount.
 Lamp house, aluminium, well ventilated, with
 Mechanical racking tray for lamp.
 Asbestos curtain.
 New type heavy iron pedestal stand with interchangeable extension pieces to suit any height or tilt with bracket for motor.
 Table top adjustable to take mechanism.
 Motor complete with rheostat.
 Pair asbestos covered flexible copper leads.
 Lens focussing mount with fine adjustment.
 Ross A.P.L. projection lens (any focus).

PRICE £141 0 0

Code Word Provert

Outfit as above with B.P.L. lens £143 0 0

Code Word Provebl

Outfit as above with D.P.L. lens £147 0 0

Code Word Provedl

CABLEGRAMS SHOULD GIVE CODE WORDS OF OUTFIT AND ADDED THEREAFTER, TYPE OF CURRENT, A.C. OR D.C., VOLTAGE, AND FOCUS OF LENS REQUIRED.



**F.C. Model with Aluminium Lamp House
and Incandescent Lamp.**

THE ROSS PROJECTOR F.C. MODEL WITH INCANDESCENT LAMP

Ross F. C. mechanism.
 16in. top and bottom spool boxes of steel blacked.
 Six 13½in. steel film spools.
 1000-watt incandescent lamp.
 Set of condenser lenses (heat proof) in mount.
 Lamp house, aluminium, well ventilated with mechanical racking
 tray for arc lamp.
 Asbestos curtain.
 New type heavy iron pedestal stand with interchangeable exten-
 sion pieces to suit any height or tilt, with bracket for motor.
 Table top adjustable to take mechanism.
 Motor with rheostat.
 Pair asbestos covered flexible copper leads.
 Lens focussing mount with fine adjustment.
 Ross A.P.L. projection lens (any focus).

PRICE £141 0 0

Code Word Proinca

Outfit above with Ross B.P.L. lens £143 0 0

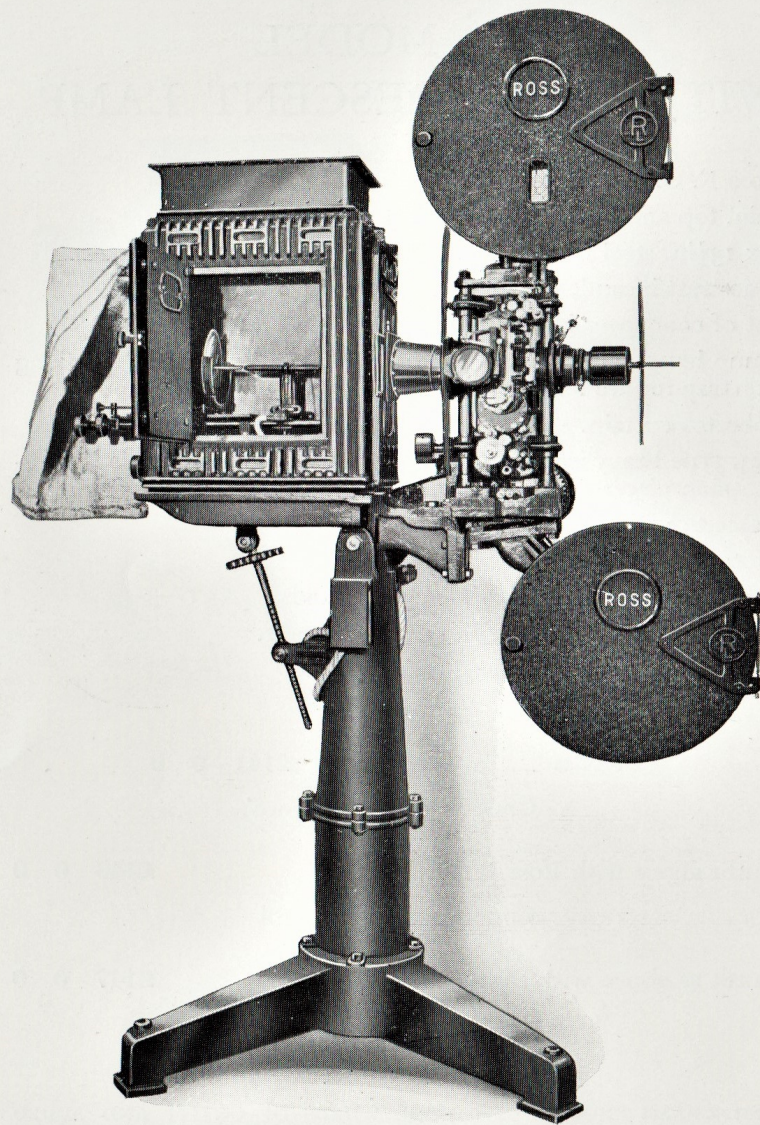
Code word Proinbl

Outfit as above with Ross D.P.L. lens £147 0 0

Code word Proindl

CABLEGRAMS SHOULD GIVE CODE WORDS OF OUTFIT AND ADDED
 THEREAFTER, TYPE OF CURRENT, A.C. OR D.C., VOLTAGE, AND FOCUS
 OF LENS REQUIRED.

THE ROSS PROJECTOR "F.C." MODEL WITH 5" MIRROR ARC



F.C. Model with Aluminium Lamp House and 5" Mirror Arc.

Ross F.C. mechanism.
16in. top and bottom spool boxes of steel blacked.
Six 13½in. steel film spools.
5in. mirror arc.
Lamp house, aluminium, well ventilated, with
Mechanical racking tray for lamp.
Asbestos curtain.
New type heavy iron pedestal stand with interchangeable extension pieces to suit any height or tilt with bracket for motor.
Table top adjustable to take mechanism.
Motor with rheostat.
Pair asbestos covered flexible copper leads.
Lens focussing mount with fine adjustment.
Ross A.P.L. projection lens (any focus).

PRICE £141 0 0

Code Word Promarc

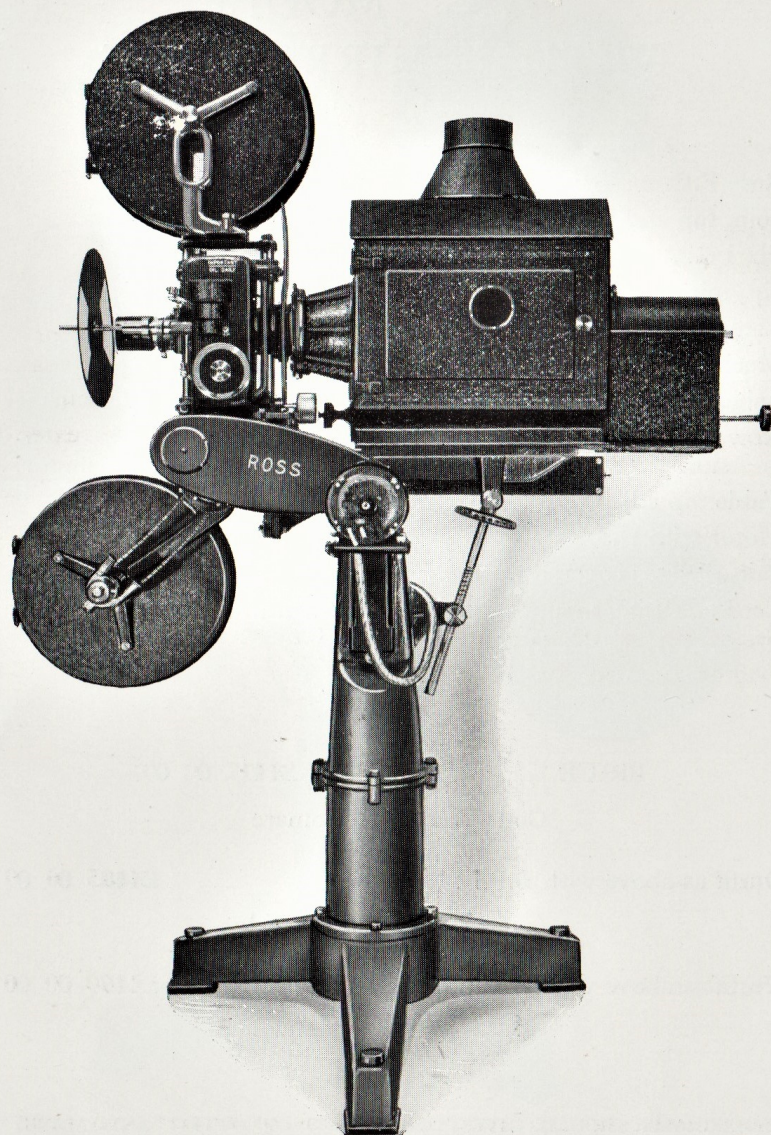
Outfit as above with B.P.L. lens £143 0 0

Code Word Promabl

Outfit as above with D.P.L. lens £147 0 0

Code Word Promadl

CABLEGRAMS SHOULD GIVE CODE WORDS OF OUTFIT AND ADDED THEREAFTER, TYPE OF CURRENT, A.C. OR D.C., VOLTAGE, AND FOCUS OF LENS REQUIRED.



F.C. Model with Patent Searchlight Arc Lamp.

THE ROSS PROJECTOR F.C. MODEL WITH PATENT SEARCHLIGHT ARC

for use with High and Low Intensity Carbons

Ross F.C. mechanism.

16in. top and bottom spool boxes of steel blacked.

Six 13½in. steel film spools.

Ross patent searchlight arc lamp, with 10in. ellipsoidal mirror.

Lamp house of sheet steel blacked, with mechanical tray. Arc entirely enclosed and well ventilated ; no loose curtains.

New type heavy iron pedestal stand with interchangeable extension pieces to suit any height or tilt.

Table top adjustable to take mechanism and with bracket for motor.

Pair asbestos covered flexible copper leads.

Lens focussing mount with fine adjustment.

Ross D.P.L. extra large aperture projection lens (any focus).

Motor complete with rheostat.

PRICE £177 0 0

Code Word Proserc

Outfit as above without lens £165 0 0

Code Word Mecanyh

Outfit as above without motor starter or lens £160 0 0

Code Word Mecanug

CABLEGRAMS SHOULD GIVE CODE WORDS OF OUTFIT AND ADDED THEREAFTER, TYPE OF CURRENT, A.C. OR D.C., VOLTAGE, AND FOCUS OF LENS REQUIRED.

THE ROSS PROJECTOR F.C. MODEL

Mechanism without spool arms, spool boxes, searchlight lamp,
stand, lens, motor or starter £75 0 0 ✓

Code Word Mecanab

Mechanism with top and bottom spool boxes, but without search-
light lamp, stand, lens, motor or starter £85 0 0

Code Word Mecanec

Mechanism with top and bottom spool boxes, stand, but without
searchlight lamp, lens, motor or starter £100 0 0

Code Word Mecanid

Mechanism with top and bottom spool boxes, stand, motor and
starter, but without searchlight lamp or lens £105 0 0

Code Word Mecanof

Mechanism with top and bottom spool boxes, stand, motor
starter and searchlight lamp, no lens £165 0 0

Code Word Mecanyh

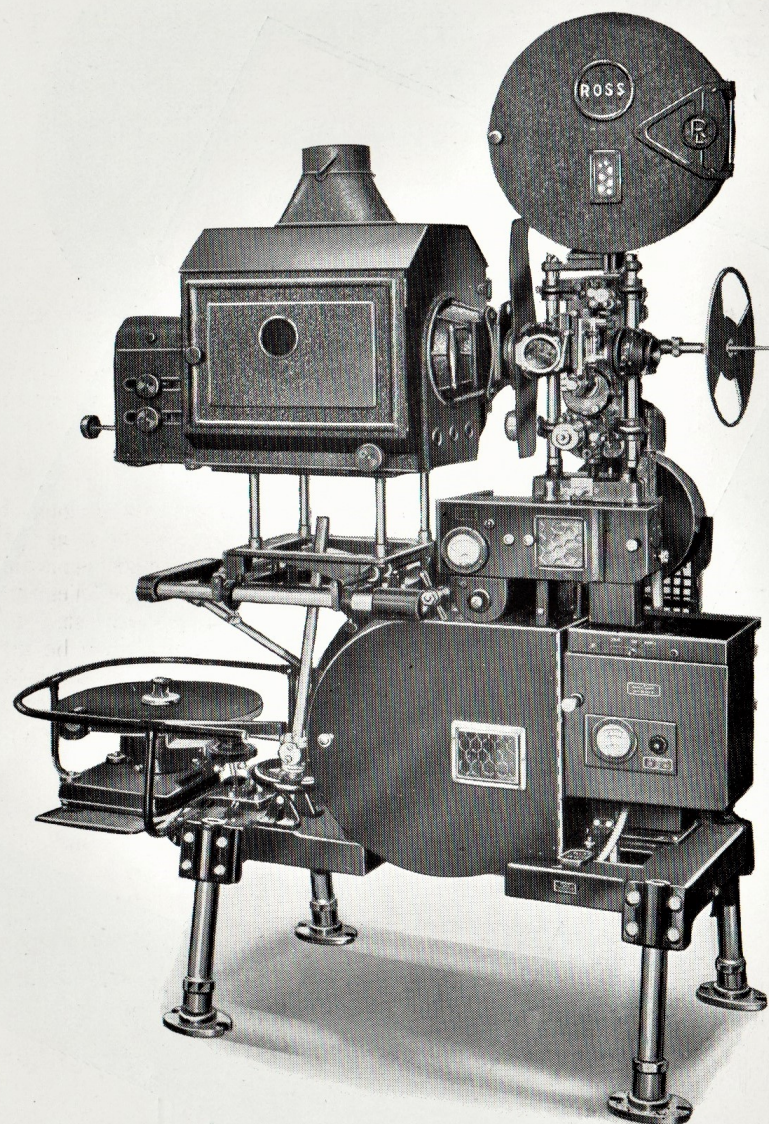
A Typical Letter of Appreciation

Dear Sir, I have pleasure in quoting to you
the following figures with reference to the Ross
Projectors installed at this theatre. These two
Projectors commenced their run on May 11th,
1929, and have averaged 13-14 hrs. per day
since that time.

For a period extending from Feb. 3rd, 1930
to Aug. 4th, 1930, six calendar months,
representing 156 working days, 10,549,181
feet of film were projected, without mechanical
stoppage, and with only two stoppages due to
film trouble.

I think this creates a record for continuous
working and freedom from film stoppages, and
is a proof of the capabilities of the projectors,
which are running perfectly, and have not had
even a screw replaced.

The above figures are taken from a record
which I have kept since my return.



F.C. Model with Searchlight Arc Lamp as adapted for use with Western Electric Co's Sound Equipment.

THE ROSS PROJECTOR F.C. MODEL WITH PATENT SEARCHLIGHT ARC LAMP

for use with High and Low Intensity Carbons
(Western Electric System)

Ross F.C. mechanism.

16in. top spool box of steel blacked.

Six 13½in. steel film spools.

Ross patent searchlight arc lamp with 10in. ellipsoidal mirror.

Lamp house of sheet steel blacked, with

Mechanical tray. Arc entirely enclosed and well ventilated.

No loose curtains. (Lamp house adaptor, bottom spool box and universal base are supplied by the Western Electric Co.)

Special base plate for attachment to universal base.

The drive is executed through a specially constructed gear box of extra heavy design, which fits on to the same spindle as the pulley of silent picture machines. To the upright spindle of this gear box is attached the universal drive of the Western Electric apparatus, and the gear box can be adjusted to conform with any angle at which the projector may be set so as to bring the complete vertical drive as nearly straight as possible. The Ross searchlight lamp fits on adaptor to the rear of the table on the universal base and brings the lamp into line with the mechanism.

Pair asbestos covered flexible copper leads.

Lens focussing mount with fine adjustment.

Ross D.P.L. extra large aperture projection lens (any focus).

PRICE £167 0 0*

Code Word Prowest

Outfit as above without Ross Searchlight lamp £107 0 0*

Code Word Prowest

Outfit as above without lamp or D.P.L. lens £95 0 0*

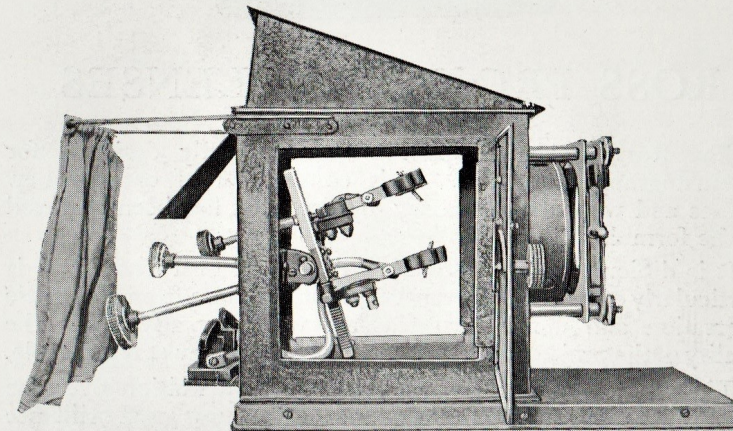
Code Word Prowold

*By arrangement with the Western Electric Co. a special allowance towards cost of drives, etc., is made of £17, and this is deducted from the above prices.



The ROSS Kinematograph Projector. Model "F.C."
With Searchlight Arc Lamp, Auto Control and Air Blower.

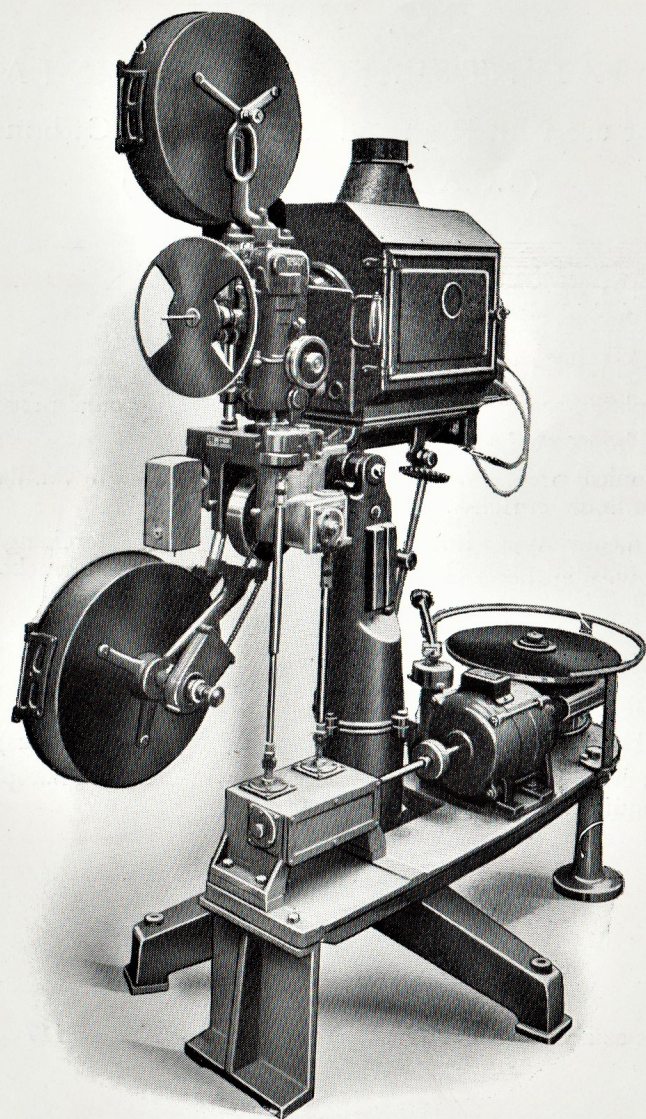
SMALL RUSSIAN IRON LANTERN



Small Russian iron lantern
with 25 ampere arc lamp
condenser, slide carrier,
adapted to fit alongside
lamp house of Ross search-
light arc for showing title
slides } £12 0 0

Code Word Ironlan

Bracket and holder for title lens	....	....	£6 10 0
Title lens, any focus	....	....	£3 0 0
Automatic control for searchlight arc lamp	....		£20 0 0
Air blowers	....	....	each £4 0 0



**F.C. Model with Searchlight Arc Lamp as adapted
for use with Picturetone Sound Equipment.**

THE ROSS PROJECTOR F.C. MODEL WITH PATENT SEARCHLIGHT ARC LAMP

for use with High and Low Intensity Carbons
(Picturetone Sound System)

- Ross F.C. mechanism.
- 16in. top and bottom spool boxes of steel blacked.
- Six 13½in. steel film spools.
- Ross patent searchlight arc lamp with 10in. ellipsoidal mirror.
- Lamp house of sheet steel blacked, with
- Mechanical tray. Arc entirely enclosed and well ventilated ;
no loose curtains.
- New heavy type iron pedestal stand with interchangeable
extension pieces, to suit any height or tilt.
- Table top adjustable.
- Pair asbestos covered flexible copper leads.
- Lens focussing mount with fine adjustment.
- Ross D.P.L. extra large aperture projection lens (any focus).
- Silent chain drives and sprockets for use with Picturetone sound
equipment.

PRICE £177 0 0

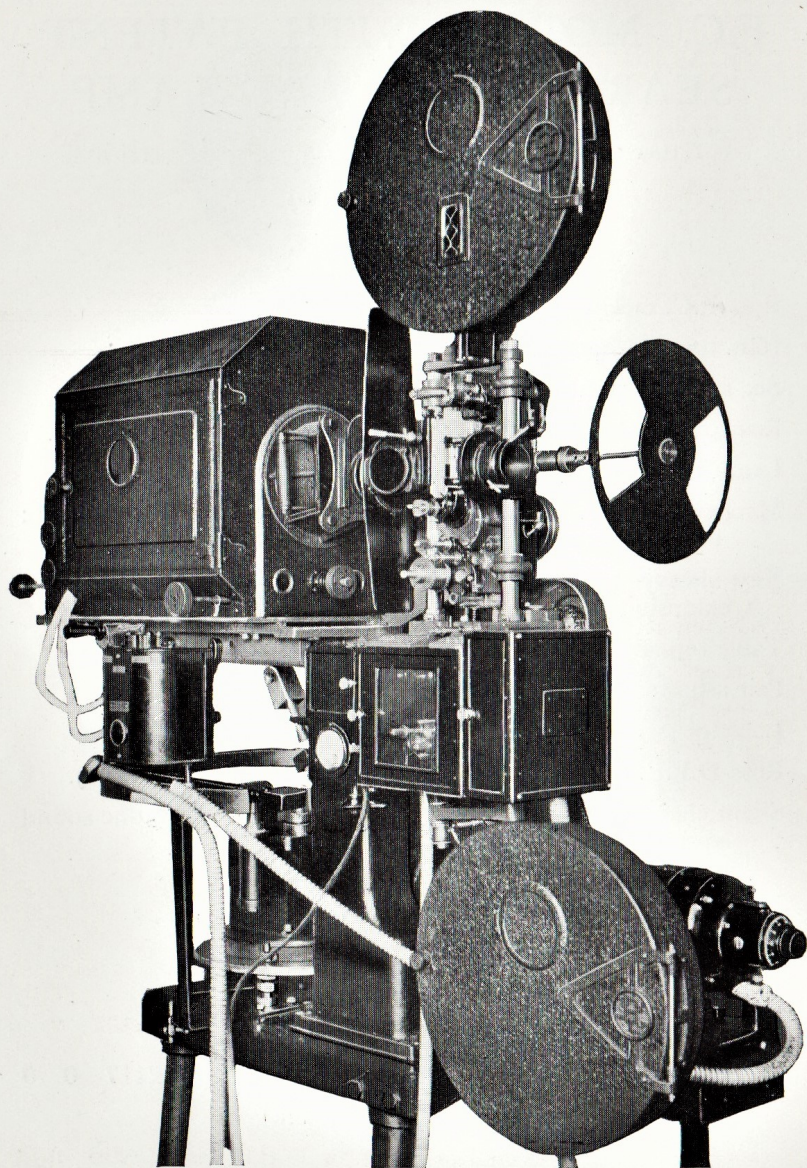
Code Word Tonepro

Outfit as above without Ross lamp £117 0 0

Code Word Toneosl

Outfit as above without Ross lamp or D.L.P. lens £105 0 0

Code Word Toneold



F.C. Model. with Searchlight Arc Lamp as adapted for use with B.T.H. System.

THE ROSS PROJECTOR F.C. MODEL WITH PATENT SEARCHLIGHT ARC LAMP

For use with High and Low Intensity Carbons
(B.T.H. System)

Ross F.C. mechanism.

16in. top and bottom spool boxes of steel blacked.

Six 13½in. steel film spools.

Ross patent searchlight arc lamp with 10in. ellipsoidal mirror.

Lamp house of sheet steel blacked, with

Mechanical tray. Arc entirely enclosed, and well ventilated ;
no loose curtains.

Table top adjustable.

Pedestal stand supplied by B.T.H. Co.

Pair asbestos covered flexible copper leads.

Lens focussing mount with fine adjustment.

Ross D.L.P. extra large aperture projection lens (any focus).

PRICE £167 0 0

Code word Betepro

Outfit as above without Ross lamp £107 0 0

Code Word Beteosl

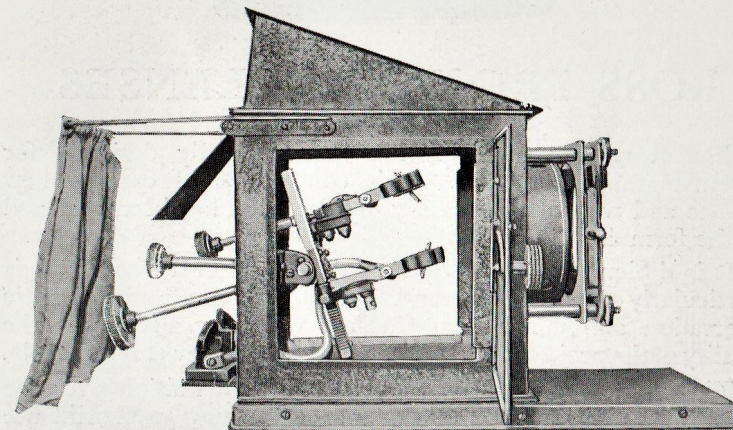
Outfit as above without Ross lamp or D.P.L. lens £95 0 0

Code Word Beteold



The ROSS Kinematograph Projector. Model "F.C."
With Searchlight Arc Lamp, Auto Control and Air Blower.

SMALL RUSSIAN IRON LANTERN



Small Russian iron lantern
 with 25 ampere arc lamp
 condenser, slide carrier,
 adapted to fit alongside
 lamp house of Ross search-
 light arc for showing title
 slides } £12 0 0

Code Word Ironlan

Bracket and holder for title lens	....	....	£6 10 0
Title lens, any focus	....	....	£3 0 0
Automatic control for searchlight arc lamp	....		£20 0 0
Air blowers	....	....	each £4 0 0



ROSS PROJECTOR LENSES

The Ross projector lens has been specially designed for cinematograph projection. It is constructed of entirely new glasses and wonderful accuracy of correction has been achieved in the formula.

It is difficult to select any special features of a lens which is particularly efficient in all respects but its freedom from chromatic aberration and coma—two features which greatly affect the quality of the projected picture—are perhaps the most remarkable.

The Ross projector lens gives excellent definition over the whole of the screen, and the large aperture ensures great brilliance of illumination.

The Ross projector lens creates a new standard of quality; it offers a combination of advantages hitherto unobtainable in any projection lens.

A.P.L.

Tube diameter 42.6 mm.

PRICE £5 10 0

Equiv. in.	Focus mm.	Aper- ture	Code Word
4½	115	f3.1	Kinman
5	127	f3.45	Kinmeo
5½	130	f3.54	Kinmip
5¾	133	f3.62	Kinmog
5⅞	140	f3.8	Kinmur
5⅞	145	f3.9	Kinmys
6	152	f4.14	Kinmait

B.P.L.

Tube diameter 52.6 mm.

PRICE £8 0 0

Equiv. in.	Focus mm.	Aper- ture	Code Word
4½	115	f2.5	Kinlab
5	127	f2.8	Kinlec
5½	130	f2.87	Kinlid
5¾	133	f2.9	Kinlof
5⅞	140	f3.1	Kinlug
5⅞	145	f3.2	Kinlyh
6	152	f3.36	Kinlaik

D.P.L. tube fitting 52.6 mm.

Ross special extra large aperture D.P.L. lens in foci from 2½ in. to 9 in. stocked in ¼ in. sizes. ½ in. sizes made to special order

PRICE £12 0 0

Some Suggestions on the Care and Cleaning of Lenses

No dust should be allowed to remain on the lens surfaces and finger marking should be avoided as much as possible.

It is surprising how dust, if allowed to collect on a lens, has the effect of dispersing and absorbing the light on its passage to the screen. The lens barrels are absolutely dustproof and it will be seldom, if ever, necessary to remove the lens components for the purpose of cleaning the inner surfaces.

Never, if it can be avoided, endeavour to unscrew the lens components, as these are carefully adjusted before being sent out from the works. If, however, it should become necessary, great care should be taken to note the manner in which the components are fitted in order that they can be replaced in the correct manner.

Do not use tissue on any account for cleaning, or even silk; the best material has been found to be old pieces of cambric which have been well washed. These should be kept in a place free from dust.

In cleaning the lens a slight application of diluted wood alcohol carefully rubbed in a circular motion will remove all scum from the surface, after which the final polishing should be done with a further piece of cambric, using the same circular motion.

Cover your lenses when not in use; they are valuable pieces of work, and this little tip will save your lenses a great deal in the long run.



ROSS NEW VARIABLE FOCUS PROJECTION LENS

(Patent applied for)

The variable focus lens is suitable for any make of projector. By its use the size of picture can be increased by about 30 per cent. The optical principles are similar to those which have been used for some time in our variable power gun-sighting telescopes.

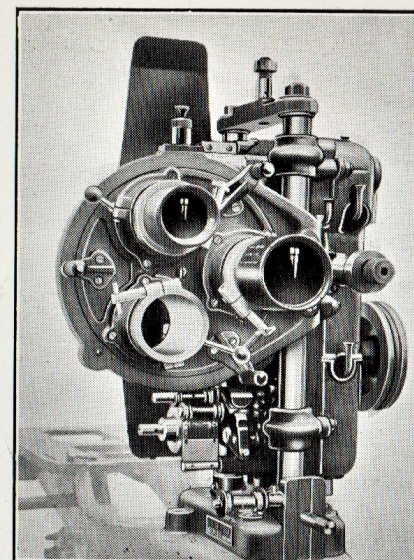
By simply turning a knurled ring of the lens mount the component lenses alter their position in relation to each other, and the focus of picture is maintained throughout the change from small picture to larger picture. Necessarily the centre of the small picture must also be the centre of the large picture and this has to be borne in mind in a cinema in which the bottom of the small picture is close to the stage level.

The Ross variable focus projection lens is made of three types:

- Type 1 covers all foci from 6in. to $4\frac{3}{8}$ in.
- Type 2 " " " 5in. to $3\frac{1}{2}$ in.
- Type 3 " " " $4\frac{1}{8}$ in. to 3in.
- Type 4 " " " $3\frac{3}{8}$ in. to $2\frac{1}{2}$ in.

The variable focus lens has to be made specially throughout and adjusted for the particular throw for which it is required. Lenses are supplied only to definite order and delivery usually runs from three to four weeks.

PRICE £25 0 0 each



ROSS LENS TURRET

(Patent applied for)

*For use with Ross
Projectors only.*

The problem of showing larger pictures has been solved by using the Ross three-lens turret which permits of instantaneous change to new picture size. Provision is made in the turret to take three lenses. One lens serves for the small picture, the second for the larger picture, and the third if used will

take a lens of any focus or will accommodate the Ross variable focus lens.

The arrangement on the turret enables the large picture to be set relatively higher than the small picture; thus in a cinema in which the bottom of small picture is close to the stage level, the large picture can be set out of the centre of the small picture relatively higher. Adjustable stops are provided which permits of the picture being raised or lowered vertically as required. Once these stops are set the projectionist can rotate the turret and each of the lenses will drop automatically into its place before the gate aperture. It is a very simple matter to change from small to large picture or vice versa. All that is needed is to rotate the lens turret until the appropriate lens is opposite the gate aperture, and this can be done in the fraction of a second.

When ordering turrets the particulars required are:—

Throw.

Size of small picture, height and width.

Size of large picture, height and width.

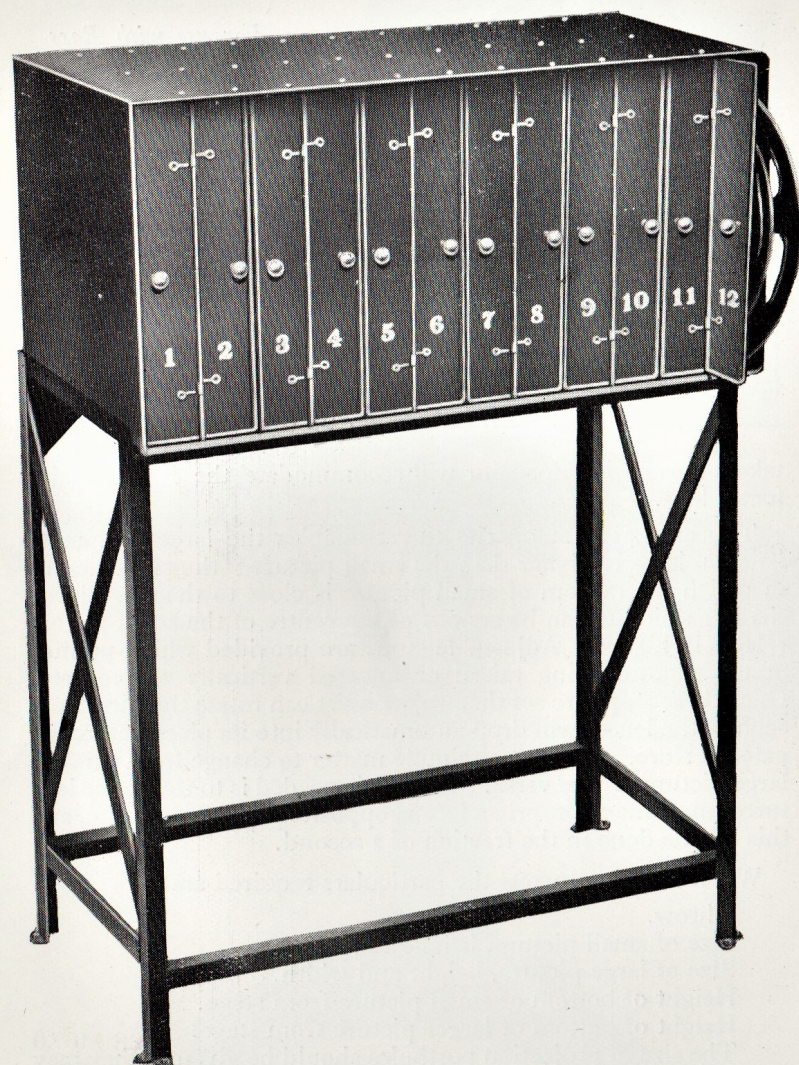
Height of bottom of small picture from stage.

Height of bottom of larger picture from stage.

The size of projection portholes should be given as they may require to be increased.

PRICE of turret (exclusive of lenses) £35 0 0 each

PRICE of D.P.L. lenses £12 0 0 each



Film Storage Cabinet

FILM STORAGE CABINET

This cabinet has been specially designed to overcome the difficulty of finding suitable storage accommodation in the operating room or in the rewinding room for the spools of film when not in use on the projector. It is so constructed that only one spool of film need be exposed at one time (see illustration showing one spool projecting slightly from one compartment,) thus reducing to the absolute minimum the risk of damage to the films through fire, for should one spool accidentally ignite, the other eleven would remain intact, as each compartment is separate and fireproof.

The cabinet itself is made of stout gauge blue planished steel, and is divided into twelve compartments, each compartment separated from the next by a double wall of metal with a $\frac{1}{2}$ in. air space between the walls, and each individual compartment is fitted with a self-closing spring door.

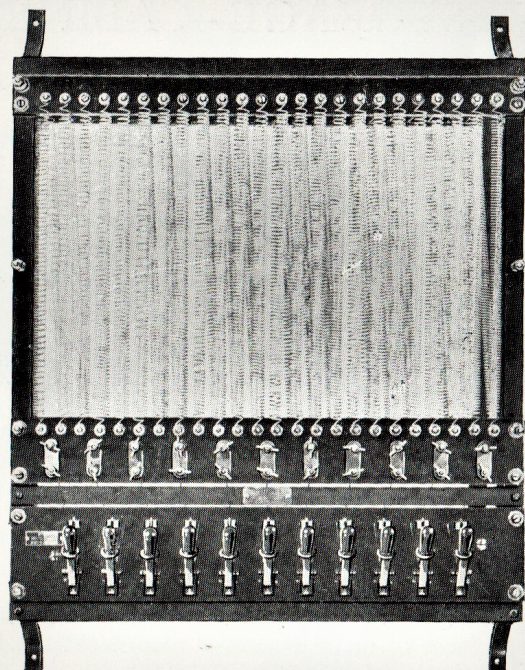
Each door is numbered and the compartments will take any size spool up to 15 in. diameter.

The inside of each compartment is so constructed that there are no projecting pieces of metal whatever to prevent the free and easy removal of the spool.

THE STAND is substantially made of wrought iron enamelled bright black, and it is so constructed that it tilts the cabinet slightly backwards to prevent the possibility of the spools rolling out.

PRICES.

12 Spool Cabinet on Stand, as illustrated	....	£8 0 0
12 Spool Cabinet without Stand	....	£6 0 0
6 Spool Cabinet on Stand	....	£5 10 0
6 Spool Cabinet without Stand	....	£4 0 0



Parallel Type Resistances.

PARALLEL TYPE RESISTANCES

The coils are of high resistance alloy mounted on black polished enamelled slate panels and controlled by substantial knife or link switches which raise current in 5 or 10 ampere steps. Terminals are of hard brass. Frame of wrought iron black enamelled. The Duplex control panel contains two sets of contacts, one above and one below the knife switches. Any switch can be operated separately, thus giving the utmost flexibility of control of either arc.

Resistances for use with low and high amperages are provided with an extra polished slate panel carrying link couplings and fly nuts, enabling a change over to be made expeditiously. All resistances have heavy copper wire or strip connections. The knife or link switches are a great improvement over the old radial contacts and arm and reduce arcing to a minimum.

Low Intensity Resistance for one Arc ; voltage across arc—50 :

Regulation		60-80 Volts.		100-110 Volts.	
Amps.	Sections.	Price.	Code Word	Price.	Code Word
5-35	1- 5 Amps				
	3-10 „	£6 15 0	Resist	£7 17 6	Resiste

Separate Control Panel—15s. 0d. extra.

Perforated Steel Guards over Coils—7s. 6d. extra.

High and Low Intensity Resistance for one Arc ; voltage across Arc—32 for High Intensity ; 50 for Low Intensity.

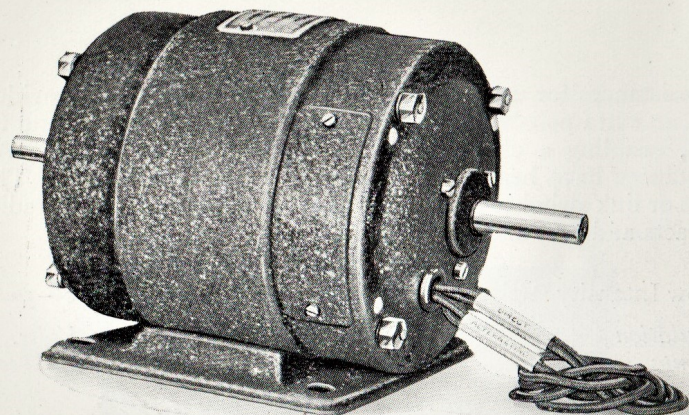
Regulation		60-80 Volts.		100-110 Volts.	
Amps.	Sections.	Price.	Code Word	Price	Code Word.
	2- 5 Amps				
5-80	7-10 „	£12 15 0	Resisab	£15 15 0	Resisec
	2- 5 „				
5-100	9-10 „	£15 15 0	Resisid	£18 15 0	Resisof
	2- 5 „				
5-120	11-10 „	£18 15 0	Resisug	£21 15 0	Resisyh

High and Low Intensity Resistance Duplex for two Arcs ; voltage across Arc—32 for High Intensity, 50 for Low Intensity :

Regulation		60-80 Volts.		100-110 Volts.	
Amps.	Sections.	Price.	Code Word.	Price.	Code Word
	2- 5 Amps				
5-80	7-10 „	£16 2 6	Resisja	£19 2 6	Resiske
	2- 5 „				
5-100	9-10 „	£19 2 6	Resisli	£22 2 6	Resismo
	2- 5 „				
5-120	11-10 „	£22 2 6	Resisnu	£25 2 6	Resishy

Perforated Steel Guards 18s. 9d. extra.

Remote Control Panel to any resistance 18s. 9d. „



MOTOR

The Universal Motor develops $1/6$ h.p. at 2,800 r.p.m. and runs equally well on either A.C. or D.C.

FRAME. The Frame consists of two steel pressings which butt together on the centre line of the motor, enclosing the fields and forming the end covers.

WINDING. The motor is series wound, like all "Universal" motors. It will give an equal performance on either A.C. or D.C. due to its having two windings, one for A.C., the other for D.C. Armatures are hand-wound, with double-covered wire, with three layers of insulation between the coils and the iron stoved, and impregnated. Field coils are former wound, insulated with three layers (six thicknesses) of tape, stoved, and impregnated.

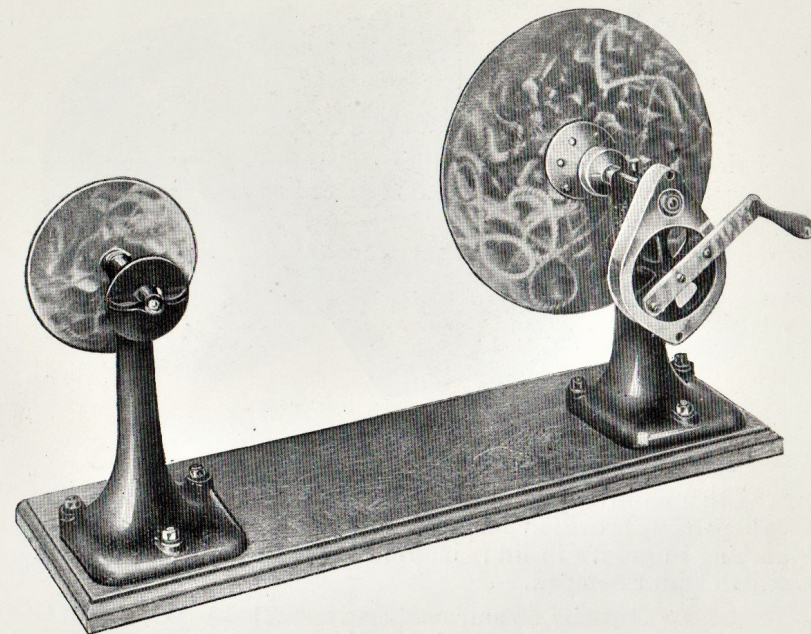
BEARINGS. The $1/2$ in. diameter shaft runs on double row self-aligning ball-bearings—a refinement seldom seen in so small a motor.

COMMUTATOR. Is larger than is usually fitted to motors of this type. The diameter is $1\frac{1}{2}$ in., with 32 segments, and a radial wearing depth of $1/8$ in.

BRUSHGEAR. Consists of two extruded brass brush boxes bolted to a Bakelite slab mounted inside the end cover. Except for the actual brush boxes, the whole brushgear is made of insulating material, and all possibility of shorts and earths is absolutely eliminated, even on 2,000 volts A.C.

PRICE of Motor—100/110, 200/220, 230/250 Volts.

D.C. or A.C. 40-60 cycles	£4 10 0
Pulleys extra.	
70 volt Motors	7s. 6d. extra.
Non-standard Frequencies	22s. 6d. extra.
$1/8$ h.p. Compound Wound Motor for D.C. Current, 70 volts.	
100-110 volts, 200-230 volts	£6 0 0 including pulley.



FILM REWINDER

Rewinder strongly constructed on cast iron uprights, bright black enamelled, the baseboard being in polished oak.

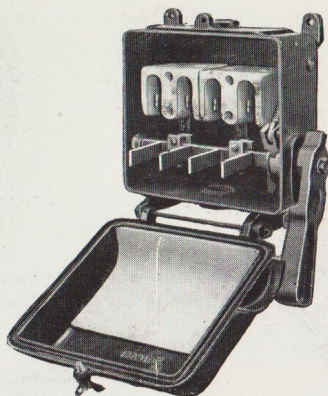
The gear wheels are helically cut with coarse teeth to stand hard wear, perfectly meshed and silent in operation; a polished aluminium guard being fitted over them for protection, and they are mounted on steel spindles, the spool re-winding spindle running in ball-bearings.

For film re-winding, one 12 in. and one 4 in brass cheeks are provided. One is fitted to a brass flange, which slides on the slotted brass tube on which the film is re-wound, the film when re-wound being simply removed by sliding the cheek along the tube. The other is fitted to a brass flange of $3/8$ in. bore to fit the fixed steel spindle carried by the other upright.

For spool re-winding, the cheek and flange, with the slotted tube used for film re-winding, are removed by unscrewing them from the spindle, the empty spool being then placed on the spindle and clamped by the cast-iron nut provided.

Price with Split Spool

£5 12 6



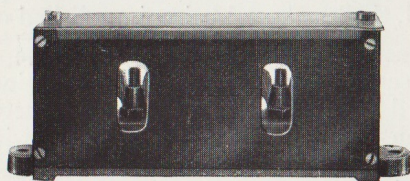
DOUBLE POLE SWITCHES

With a positive quick make and break action, mounted on iron casting with provision for rendering weatherproof by inserting packing in groove in lid; interlocked, preventing operation of switch with case open.

Capacity 60 amps £1 10 0

Capacity 100 amps £4 15 0

Extra for Bracket for fixing to floor 16s. 6d.

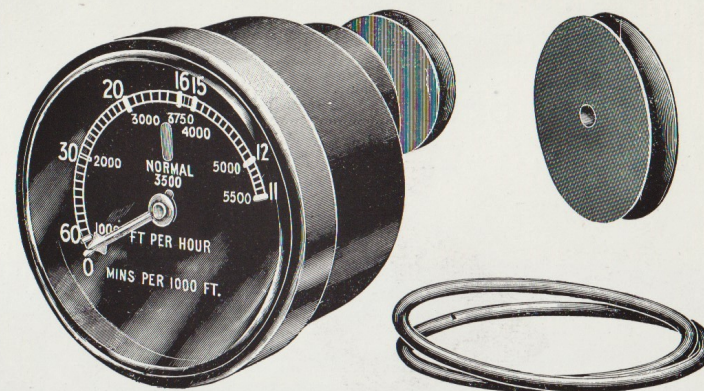


TERMINAL BLOCKS

A substantial casting with insulating cover containing a machined fibre block upon which two terminal bolts are mounted, and fitted with wing nuts making a quick and efficient connection to lamp leads. It is fixed by bolts to the base plate of lamp house.

Price each 17s. 6d.

100 ampere Flexible Copper Leads, asbestos covered
per pair 17s. 6d.



CINEMATOGRAPH SPEEDOMETERS

This small instrument tells you at a glance the exact speed the film is travelling through the Projector, so that it is possible to either advance or retard the speed of your machine accordingly.

The dial indicates "Feet per hour" and "Minutes per 1,000 feet."

PRICE £8 5 0 each

OIL FOR PROJECTOR MECHANISM

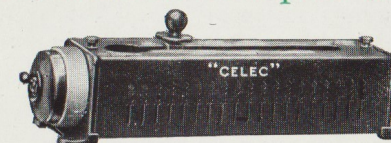
of suitable viscosity and quite free from fatty acids. It is a pure hydrocarbon and specially recommended to be used.

Unsuitable oil causes damage to Maltese Cross movement and corrosion of bearings.

Per ½-gallon tin 9s.

Per 1-gallon tin 18s.

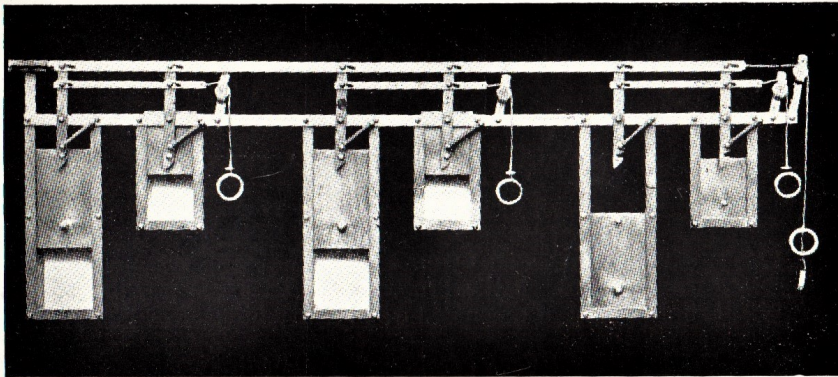
Sliding Resistances for Speed Regulation



PRICE with Tumbler Switch £1 16 0 each

CONTROLLABLE FILM SHUTTERS

for use in CINEMATOGRAPH THEATRES



Set for Two Projectors and One Bi-unial.

These Shutters are strong, mechanically made articles, which can always be relied on in case of emergency, there being nothing to get out of order. Each shutter is fitted with a projecting pin, which, as the shutter is raised, engages with a slotted lever kept vertical by a spring. A slight pull on the ring shown draws the lever over and the shutters drop simultaneously by their own weight, the levers returning to the vertical position ready to snap the shutters when again raised.

Set of Controllable Fire Shutters for four openings : one, 1ft. 7½in.
x 9in. and three, 9in. x 9in. complete with glazed casements
and counterweights £20 12 6

Prices of other sizes on application.

