

(1) Number of pages _____

(2) Date of repair _____

(3) Initials of the Referencer _____

MADRAS RECORD OFFICE.

Government of Madras.

Public Works DEPARTMENT.

G.O. No. 2747

Press

Misc.

675-626

Dated 30-8

1866.

Not to be folded or roughly handled

*Proceedings of the Madras Government, Public Works Department,
30th August 1866.*

No. 675. Read the following letter from the Superintendent of Marine, to the Secretary to Government, Public Works Department, dated Madras, 14th August 1866, No. 3,205:—

1. Referring to the Proceedings of Government, Marine Department, of the 27th ultimo, No. 182, I have the honor to forward the plans of the Cochin and Hope Island light lanterns with the instructions for fitting them, and specifications of the light-rooms. They are submitted with a view to their being furnished, through your Department, to the Officers in charge of the Districts in which the lights are situated.

2. It will be necessary that an estimate be framed of the expense that will probably be incurred in fixing the new lantern on the Hope Island lighthouse.

—
No. 8,722.

*Specification of cast-iron Light-rooms and lanterns for Hope Island and Cochin Lighthouses
by D. & T. Stevenson, Civil Engineers, Edinburgh.*

LIGHT-ROOM.

1. The light-room which is to be octagonal in plan, is to be constructed according to the form and dimensions shown on the accompanying drawing No. 1, and described in the following specification.

2. It is to consist of cast-iron plates measuring 3 feet in total height, and 6 feet 9 inches in external diameter. The plates are to be half inch thick, and to have flanges $\frac{3}{4}$ inch thick and 4 inches broad, except the upper flange which is to be 6 inches broad. The whole of the plates are to be strengthened by angular brackets of the same thickness as the plates, in the manner shewn.

Casting and fitting of plates.—The whole of the plates are to be cast perfectly fair and smooth in the skin, no plugging with lead or other material being allowed. Each plate is to have fitting strips 1 inch broad all round its outer edge and across the flanges at the edges, and at each bolt hole; fitting strips are also to be formed across top of upper flange to suit those on under side of sole plate of lantern. A space of $\frac{1}{4}$ to $\frac{3}{8}$ of an inch is to be left for rust between the flanges.

Bolts and holes.—The plates are to be connected together by $\frac{3}{4}$ inch bolts. Two of the bolts in the vertical joints of each pair of plates are to be carefully turned with a slight taper, and fitted into widened holes; the heads and nuts also to be fitted to bear close throughout. The other bolts are to be carefully forged and fitted so that the heads and nuts shall bear fairly. The light-room is to be fixed to the tower by one bat bolt in each plate 4 inches long and $1\frac{1}{2}$ inch screw, properly dove-tailed. The bolts to be of B. B. Glasgow iron.

Light-room door.—The light-room door is to be made of malleable iron, $\frac{1}{4}$ inch thick, strengthened by a bar passing all round it $1\frac{1}{2}$ inch square. The edges of the door are to be filed and fitted to the strips which are to be cast on the door cheeks, as shown on the plan. The door is to open outwards, and to be furnished with strong brass hinges and lock, made to directions, and paid for as extra work.

Timber lining.—The light-room is to be lined with boarding $\frac{3}{4}$ inch thick, in breadths not exceeding $4\frac{1}{2}$ inches, and grooved and feathered and beaded on the joints. This boarding is to be jammed in between the metal and lining, and to be $1\frac{1}{2}$ inch thick. This lining is not included in the contract.

LANTERN.

Sole plate.—The sole plate is to be cast in four pieces fitted and joined together by two $\frac{1}{2}$ inch screws in each joint, and fixed down to light-room by one $\frac{3}{4}$ inch screw bolt in each side; the ends of the different pieces are to be thickened as shown, and to receive this additional thickness depressions are to be formed in upper flange of light-room.

*Proceedings of the Madras Government, Public Works Department,
30th August 1866.*

Sash frames.—The sash frames are to be made of the form and dimensions shown. Each pane is to be fixed to the sole plate by three $\frac{3}{8}$ inch screws. The glass slips are to be of brass of the size and section shown, and to have not less than $\frac{1}{4}$ inch hold of the glass, and are to be fixed to the sash frames and cornice by five $\frac{3}{8}$ inch brass screws in the sides and 4 at top or bottom of each pane. The lower side of sash frames to have fitting strips, viz., one at each hole, and at each end.

Cornice.—The cornice is also to be cast in four pieces, forming an eight-sided polygon. It is to be of the form and dimensions shown; carefully fitted at joints fixed to the palm at top of each sash frame by two $\frac{5}{8}$ inch screws, and the castings are to be connected with each other at the overlaps by two $\frac{1}{2}$ inch screws. At the four solid angles of the cornice rain water pipes 1 inch diameter of No. 21 wire gauge copper, are to be fitted as shown. These pipes are to be led down one side of a sash frame, and are to be fixed thereto by two clips of No. 17 wire gauge copper. They are to be bent to discharge over the edge of the sole plates, to which they are also to be secured by a double clip. The cornice is to be recessed to flush the cast-iron rafters hereafter specified, which are to be fixed to it with two $\frac{1}{2}$ inch screws in each.

Rafters.—The rafters, which are to be of cast-iron, are to be eight in number for the lantern of the form shown in the section. They are to be fitted at the bottom to the recess in the cornice plates; at top they are to have T formed heads, and to be fixed to the top ring by two $\frac{3}{4}$ inch screws in each rafter. The top ring is to be of good malleable iron of the form and dimensions shown, and in one piece.

Roof plates.—The roof plates are to be of the best galvanized charcoal iron; the plates of the outer roof to be No. 14 wire gauge, the plates of the inner roof to be No. 17. The plates of the outer roof are to be fixed to the rafters by $\frac{1}{2}$ inch counter-sunk screws to the cornice by similar screws with round heads, all 3 inches apart, and to the malleable iron top ring by a $\frac{1}{2}$ inch copper bolt in each plate which will also pass through the inner ventilator and the inner dome, and by the bolts which secure the top of the ridge covers as hereafter specified. The plates of the inner roof are also to be secured to the rafters and to the cornice plates by $\frac{1}{2}$ inch round headed screws about 4 inches apart.

Ridge covers.—Ridge covers are to be made as shown. They are each to be fixed to the rafters by four $\frac{1}{2}$ inch screws, and at the top they are to be bolted to the malleable iron ring by a $\frac{1}{2}$ inch iron bolt, which is to pass through the ridge cover, inner ventilator, roof plates, and ring, and bind all firmly together.

Ventilator.—The ventilator is to be made as shown in the drawings, and of the best sheet copper of the weight of 3½ lbs. per superficial foot. The inner ventilator is to be carefully soldered at all joints, and to be dished at the bottom to fit the cone of the top ring to which it is to be secured by the copper and iron bolts already specified. The hemispherical cap is to be raised out of one piece, and it and the outer ventilator are to be revetted to four copper straps measuring 1½ inch by ½ inch, which are to be bent at foot to fit the angle of the outer roof plates, to which they are to be afterwards rivetted.

Glass.—The lantern to be glazed with plate glass of the best quality of polished plate, not less than ¼ inch nor more than ⅜ inch thick. A reserve of six panes also to be furnished. The glass is to be free of striae air bells, and other blemishes, and both faces are to be strictly parallel.

Storm panes.—Two storm panes glazed, are to be furnished similar to a pattern. Two sets of spare glass are also to be furnished for each.

Blinds.—The Lantern is to be fitted with blinds of good unbleached linen, mounted on the best spring rollers. They are to be mounted so that when down they may hang close together with the cloth of each blind overlapping those on each side of it 1 inch.

All the cast-iron work is to be left as cast, the surfaces being clean and sharp in the angles except all fitting surfaces, which are to be carefully chipped and filed. The brass slips are to be filed on the edges and fitting surfaces. All bolts and nails to be turned, and all are to have countersunk heads, except those otherwise drawn or specified.

*Proceedings of the Madras Government, Public Works Department,
30th August 1866.*

Painting.—The whole of the iron work of light-room and lantern is to receive three coats of red lead paint.

The whole of the work to be done to the entire satisfaction of Messrs. David and Thomas Stevenson, Civil Engineers, who are to have the power of rejecting materials or workmanship which, in their opinion, do not fulfil the terms of the specification. The price for the light-room and lantern to include fitting up in the workshops of the contractor, and packing for transmission to India and delivery at a Railway Station.

The whole to be completed within four months from the date of acceptance of the offer, but if not completed within that time, the contract price shall suffer a reduction at the rate of £1 sterling per day for each day after the time stated.

Should any dispute arise between the contracting parties as to the quality of the material, the workmanship, time of completion, or as to the true import and meaning of this specification, and the plans or drawings relative hereto, the same shall be and are hereby referred to the said Messrs. David and Thomas Stevenson whose decision shall be final and binding on all parties.

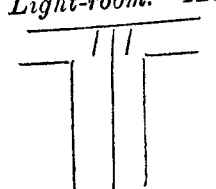
(Signed) D. & T. STEVENSON.

EDINBURGH,

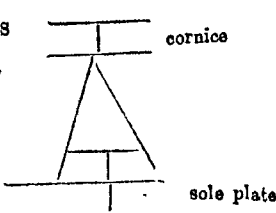
6th September 1865.

*Instructions for fitting up lantern and apparatus for Cochin and Hope Island Lighthouses,
by D. & T. Stevenson, Civil Engineers, Edinburgh.*

1. Before beginning to fit up the lantern it is desirable to unpack all the boxes and arrange them in the order of the following marks.

2. **Light-room.**—The plates are marked with figures on the inside of the flanges of joints thus  and so on.

3. **Sole plate of lantern.**—The sole plates of lantern are marked on the inside 1, 2, 3, &c., corresponding marks being made on the light-room plates.

4. **Sash frames.**—The sash frames are marked at top and bottom thus  marks to correspond being made on the sole and cornice plates.

5. **Rafters and ridge covers.**—Are marked on palms at lower end and T at top, as also their fitting pieces on cornice and top ring.

6. **Roof plates.**—Are marked at top and bottom having corresponding marks on cornice plates and top ring.

7. **Hemispheres of dome ventilator.**—Are marked on the supporting palms having corresponding marks on the ribs.

7. **Blinds.**—The plates for fixing blinds to are marked and have corresponding marks on cornice, the fixings for rollers are on their places.

9. **Ventilators in light-room.**—The ventilating boxes are marked, and have corresponding marks on the light-room plates.

10. The lower flanges of the light-room plates are to be bedded on the top of the tower in red lead putty, and the joints of the plates should be filled with rust cement from the inside, a space having been left for this purpose; the edges and fitting strips of the side flanges should be coated with white lead before being put together.

11. The sole plate of the lantern to be bedded on the top of the light-room with red lead putty and the astragals bedded on the sole plate in a similar manner. The rafter covers of roof should also be bedded in putty.

12. Four ventilators have been supplied. These are to be fitted on the light-room plates as marked, holes being cut in the wooden lining when it is erected for the handles.

13. The lining should be of well seasoned timber, of a quality suited to the climate.

14. In glazing the lanterns the panes which have their points downwards should be packed or propped up nearly as high as they can go by slips of lead put under the points, as otherwise from their triangular form they would jam in the frames and would run a great risk of being broken by any great variations of temperature. Care should be taken while glazing that there is no damp on the glass or astragals. The brass slips for holding in the panes are to be bedded in putty before being screwed up. Care should also be taken in putting the lantern together that the surfaces are all dry before applying the putty.

15. *Apparatus for Cochin.*—The apparatus consists of a fourth order fixed light to illuminate 270° , and is to be placed on the table and pillar in crate No. 21. Three lamp fountains have been sent. The fountain is hooked on the apparatus framing on the blank side, hooks being placed on the apparatus framing for this purpose.

16. *Apparatus for Hope Island.*—The apparatus is a fourth order revolving light. The machine is in box No. 20 and is in one piece, and the enclosed sketch shews the lowest prism of the apparatus and the revolving carriage on the top of the machine case, so that we do not apprehend any difficulty will be experienced in fitting the whole in the light-room.

17. The lamp fountain in this case is placed on the top of the apparatus, and has a tube attached to it which leads to a constant level fountain, keepers into which this tube sits are fixed on the setting of the apparatus. The fountain can be filled by turning round the slide at bottom of tube which will shut off the oil, then remove the screw on top of fountain. When the fountain has been filled the top screw should be carefully screwed home. The constant level fountain will take its own place by screwing home the fixing screw of connecting tube into setting of apparatus.

18. The height of the top of burner is marked on the brass setting of the fixed and revolving apparatus, and in replacing burners care should be taken that this height is strictly adhered to.

(Signed) D. & T. STEVENSON.

Directions for the Keepers of Lighthouse.

Great care should be bestowed in keeping everything connected with a Lighthouse in proper efficiency; the optical apparatus, consisting of reflectors, lenses, or prisms, suffers materially from the effect of dust in injuring its polish, and the proper burning of the lamps is impaired by a want of due attention to their cleanliness and the state of the wicks.

The following general directions may be found useful:—

Metallic Reflectors.—In Lighthouses where metallic reflectors are employed, they should always be carefully dusted with a feather or other fine brush before being burnished; and particular care should be taken that the chamois skins used in rubbing them be perfectly free from dust or gritty particles. Without such precautions the cleansing process will only tend to scratch the reflectors.

The great art of keeping reflectors clean consists in the daily, patient, and skilful application of manual labour in rubbing their surfaces, beginning at the centre, and gradually working outwards with a circular motion of the hand. No damp or wet substance should ever be applied to metallic reflectors. If their lustre becomes dim, a little prepared rouge, of the finest description, in the state of an impalpable powder, may be employed on the chamois skin as a polisher.

If spare metallic reflectors have long lain unused, and have consequently become covered with a thick and dark coating of oxide, rouge mixed with oil may first be applied to remove the film of oxide; after which, dry rouge should be dusted on, and the reflector polished in the usual manner with a dry and soft chamois skin.

Glass Lenses or Prisms.—In Lighthouses where glass lenses or prisms are used, they should be cleaned every day, being first freed from dust by a feather or other soft brush, and then rubbed with a soft chamois skin free from anything that would injure the polish of the glass. If the glass becomes greasy, it should first be washed with a linen cloth steeped in spirit of wine, thereafter carefully dried with a soft and dry linen rubber free from all dust or gritty particles, and finally rubbed with a fine chamois skin. The rubbers used for the glass work must also be free from grease. It may sometimes be necessary to use a little fine rouge with a chamois skin for restoring any deficiency of polish which may occur; but in well-managed dioptric Lighthouses this application will seldom be necessary.

Lamps.—The brass work of the lamps is to be kept clean by polishing with fine rotten-stone. Great care should be taken that the lamps are accurately in the focus of the illuminating apparatus, and that the flow of oil is such that a proper height of flame is maintained in conformity with the diagram, which should be framed and hung up in the light-room. If the flame cannot be maintained to the standard height, the keeper should immediately examine whether or not this is due to want of cleanliness of the burner, want of proper flow of oil, or any imperfection in the wicks or oil, or the draft of the lamp chimney. The wicks should be *gradually* raised, during the first twenty minutes of burning, to the level of $\frac{1}{4}$ inch above the burners—a height which should not be exceeded. In Argand lamps the oil should be turned on ten minutes before the time of lighting; and to prevent overflow it should be turned off ten minutes before the time of extinguishing. These Argand lamps are generally trimmed once during the night, when colza oil is used; but they require it oftner with sperm. A sinking of the flame is the indication that it is required. The compound wick mechanical lamps being all constructed to give a plentiful overflow (from three to four times the quantity consumed), the wicks char but slowly, and the lamp should burn when in good order the whole night without the wicks requiring to be touched when colza oil is used. When, however, the flame is seen to be sinking, the lamp must be trimmed. This is done by the trimming hooks, which are passed up the air spaces of the burner, and used to knock off and pick out the charred wicks piecemeal. In all cases where the apparatus is illuminated by a single central burner, a spare burner trimmed and ready for lighting should be kept in the light-room, with coupling-plyers, so that it may at once be applied should anything go wrong with the burner, and the Liverpool or temporary lamp should also be kept trimmed and in good burning order, in case anything should interrupt the working of the pumps. In preparing the wicks for lighting, they must be cut perfectly smooth and level; and after being used a night, the charred part must be cut away before they are relit.

In making new pump-leathers for the mechanical lamp, the following directions must be attended to:—Before placing the skin in the press, cut a piece $10\frac{1}{2}$ by $3\frac{1}{2}$ inches, and steep it in colza oil for an hour. Then, after cleaning it by a light rub on both sides with cotton waste, press it in the usual manner, taking care to punch it accurately for the screws of the press. Bring down the press very slowly and equally over all—not less time than one hour should be taken to bring down the press; thereafter the skin should be allowed to remain one hour in the press before it is finally placed in the chambers.

Machinery.—In all Lighthouses where machinery is employed to propel revolving lights or to work mechanical lamps, it should be kept scrupulously clean, and all working surfaces should be regularly and carefully oiled.

If the machine does not go well, and there is no very obvious cause, it will generally be found that the end of the fly-shaft or its footstep is “cutting.” The footsteps are easily shifted, and the fly-shaft can generally be smoothed on the oil-stone; but if it be much injured, the spare one should be put in and the damaged one sent to a proper workman.

*Proceedings of the Madras Government, Public Works Department,
30th August 1866.*

Windows.—The windows of the lantern should be regularly cleaned every day, and washed with water when necessary, to remove sea-spray or other obstructions to the passage of the light, and for the same reason they should be rubbed during the night when they become obscured by condensation or "sweating." The keepers should take care, by opening doors or otherwise, to admit a sufficient supply of air to insure the proper burning of the lights and prevent condensation. The storm-panes should always be kept in readiness for immediate use, in case of accident.

D. & T. STEVENSON,
Civil Engineers, Edinburgh.

No. 676.

ORDER THEREON, 30th August 1866, No. 2,747.

CIVIL WORKS, No. 99.

1. A copy of each of the papers received with the foregoing letter will be furnished to the Superintending Engineers of the 1st and 7th Divisions in continuation of the Orders of Government No. 2,454, dated the 4th August 1866.

2. The Superintending Engineer of the 1st Division will submit at an early date the required estimate for fixing the new lantern on the Hope Island Lighthouse.

(True Extract)

(Signed) CHARLES A. ORR, Colonel, R. E.,
Secretary to Government.

To the Superintending Engineers, 1st and 7th Divisions, with Plans.
,, Superintendent of Marine.
,, Marine Department.

Exd. S. T. Augustin.

*1/11/66
J. A. Orr
24/10/66*

DIRECTIONS

FOR THE

KEEPERS OF

LIGHTHOUSE.

GREAT care should be bestowed in keeping everything connected with a Lighthouse in proper efficiency; the optical apparatus, consisting of reflectors, lenses, or prisms, suffers materially from the effect of dust in injuring its polish, and the proper burning of the lamps is impaired by a want of due attention to their cleanliness and the state of the wicks. The following general directions may be found useful:—

METALLIC REFLECTORS.

In Lighthouses where metallic reflectors are employed, they should always be carefully dusted with a feather or other fine brush before being burnished; and particular care should be taken that the chamois skins used in rubbing them be perfectly free from dust or gritty particles. Without such precautions the cleansing process will only tend to scratch the reflectors.

The great art of keeping reflectors clean consists in the daily, patient, and skilful application of manual labour in rubbing their surfaces, beginning at the centre, and gradually working outwards with a circular motion of the hand. No damp or wet substance should ever be applied to metallic reflectors. If their lustre becomes dim, a little prepared rouge, of the finest description, in the state of an impalpable powder, may be employed on the chamois skin as a polisher.

If spare metallic reflectors have long lain unused, and have consequently become covered with a thick and dark coating of oxide, rouge mixed with oil may first be applied to remove the film of oxide; after which, dry rouge should be dusted on, and the reflector polished in the usual manner with a dry and soft chamois skin.

GLASS LENSES OR PRISMS.

In Lighthouses where glass lenses or prisms are used, they should be cleaned every day, being first freed from dust by a feather or other soft brush, and then rubbed with a soft chamois skin free from anything that would injure the polish of the glass. If the glass becomes greasy, it should first be washed with a linen cloth steeped in spirit of wine, thereafter carefully dried with a soft and dry linen rubber free from all dust or gritty particles, and finally rubbed with a fine chamois skin. The rubbers used for the glass work must also be free from grease. It may sometimes be necessary to use a little fine rouge with a chamois skin for restoring any deficiency of polish which may occur; but in well-managed dioptric Lighthouses this application will seldom be necessary.

LAMPS.

The brass work of the lamps is to be kept clean by polishing with fine rotten-stone. Great care should be taken that the lamps are accurately in the focus of the illuminating apparatus, and that the flow of oil is such that a proper height of flame is maintained in conformity with the diagram, which should be framed and hung up in the Light-room. If the flame cannot be maintained to the standard height, the Keeper should immediately examine whether or not this is due to want of cleanliness of the burner, want of proper flow of oil, or any imperfection in the wicks or oil, or the draft of the lamp chimney. The wicks should be *gradually* raised, during the first twenty minutes of burning, to the level of $\frac{1}{4}$ inch above

the burners—a height which should not be exceeded. In Argand lamps the oil should be turned on ten minutes before the time of lighting; and to prevent overflow it should be turned off ten minutes before the time of extinguishing. These Argand lamps are generally trimmed once during the night, when colza oil is used; but they require it oftener with sperm. A sinking of the flame is the indication that it is required. The compound wick mechanical lamps being all constructed to give a plentiful overflow (from three to four times the quantity consumed), the wicks char but slowly, and the lamp should burn when in good order the whole night without the wicks requiring to be touched when colza oil is used. When, however, the flame is seen to be sinking, the lamp must be trimmed. This is done by the trimming hooks, which are passed up the air spaces of the burner, and used to knock off and pick out the charred wicks piecemeal. In all cases where the apparatus is illuminated by a single central burner, a spare burner trimmed and ready for lighting should be kept in the lightroom, with coupling-pliers, so that it may at once be applied should anything go wrong with the burner, and the Liverpool or temporary lamp should also be kept trimmed and in good burning order, in case anything should interrupt the working of the pumps. In preparing the wicks for lighting, they must be cut perfectly smooth and level; and after being used a night, the charred part must be cut away before they are relit.

In making new pump-leathers for the mechanical lamp, the following directions must be attended to:

—Before placing the skin in the press, cut a piece $10\frac{1}{2}$ by 25 inches, and steep it in colza oil for an hour. Then, after cleaning it by a light rub on both sides with cotton waste, press it in the usual manner, taking care to punch it accurately for the screws of the press. Bring down the press very slowly and equally over all—not less time than one hour should be taken to bring down the press; thereafter the skin should be allowed to remain one hour in the press before it is finally placed in the chambers.

MACHINEERY.

In all Lighthouses where machinery is employed to propel revolving lights or to work mechanical lamps, it should be kept scrupulously clean, and all working surfaces should be regularly and carefully oiled.

If the machine does not go well, and there is no very obvious cause, it will generally be found that the end of the fly-shaft or its footstep is “cutting.” The footsteps are easily shifted, and the fly-shaft can generally be smoothed on the oil-stone; but if it be much injured, the spare one should be put in and the damaged one sent to a proper workman.

WINDOWS.

The windows of the lantern should be regularly cleaned every day, and washed with water when necessary, to remove sea-spray or other obstructions to the passage of the light, and for the same reason they should be rubbed during the night when they become obscured by condensation or “sweating.” The Keepers should take care, by opening doors or otherwise, to admit a sufficient supply of air to insure the proper burning of the lights and prevent condensation. The storm-panes should always be kept in readiness for immediate use, in case of accident.

D. & T. STEVENSON,

Civil Engineers, Edinburgh.

DIRECTIONS

FOR THE

KEEPERS OF

LIGHTHOUSE.

GREAT care should be bestowed in keeping everything connected with a Lighthouse in proper efficiency; the optical apparatus, consisting of reflectors, lenses, or prisms, suffers materially from the effect of dust in injuring its polish, and the proper burning of the lamps is impaired by a want of due attention to their cleanliness and the state of the wicks. The following directions may be found useful:—

METALLIC REFLECTORS.

In Lighthouses where metallic reflectors are employed, they should always be carefully dusted with a feather or other fine brush before being burnished; and particular care should be taken that the chamois skins used in rubbing them be perfectly free from dust or gritty particles. Without such precautions the cleansing process will only tend to scratch the reflectors.

The great art of keeping reflectors clean consists in the daily, patient, and skilful application of manual labour in rubbing their surfaces, beginning at the centre, and gradually working outwards with a circular motion of the hand. No damp or wet substance should ever be applied to metallic reflectors. If their lustre becomes dim, a little prepared rouge, of the finest description, in the state of an impalpable powder, may be employed on the chamois skin as a polisher.

If spare metallic reflectors have long lain unused, and have consequently become covered with a thick and dark coating of oxide, rouge mixed with oil may first be applied to remove the film of oxide; after which, dry rouge should be dusted on, and the reflector polished in the usual manner with a dry and soft chamois skin.

GLASS LENSES OR PRISMS.

In Lighthouses where glass lenses or prisms are used, they should be cleaned every day, being first freed from dust by a feather or other soft brush, and then rubbed with a soft chamois skin free from anything that would injure the polish of the glass. If the glass becomes greasy, it should first be washed with a linen cloth steeped in spirit of wine, thereafter carefully dried with a soft and dry linen rubber free from all dust or gritty particles, and finally rubbed with a fine chamois skin. The rubbers used for the glass work must also be free from grease. It may sometimes be necessary to use a little fine rouge with a chamois skin for restoring any deficiency of polish which may occur; but in well-managed dioptric Lighthouses this application will seldom be necessary.

LAMPS.

The brass work of the lamps is to be kept clean by polishing with fine rotten-stone. Great care should be taken that the lamps are accurately in the focus of the illuminating apparatus, and that the flow of oil is such that a proper height of flame is maintained in conformity with the diagram, which should be framed and hung up in the Light-room. If the flame cannot be maintained to the standard height, the Keeper should immediately examine whether or not this is due to want of cleanliness of the burner, want of proper flow of oil, or any imperfection in the wicks or oil, or the draft of the lamp chimney. The wicks should be *gradually* raised, during the first twenty minutes of burning, to the level of $\frac{1}{4}$ inch above

the burners—a height which should not be exceeded. In Argand lamps the oil should be turned on ten minutes before the time of lighting; and to prevent overflow it should be turned off ten minutes before the time of extinguishing. These Argand lamps are generally trimmed once during the night, when colza oil is used; but they require it oftener with sperm. A sinking of the flame is the indication that it is required. The compound wick mechanical lamps being all constructed to give a plentiful overflow (from three to four times the quantity consumed), the wicks char but slowly, and the lamp should burn when in good order the whole night without the wicks requiring to be touched when colza oil is used. When, however, the flame is seen to be sinking, the lamp must be trimmed. This is done by the trimming hooks, which are passed up the air spaces of the burner, and used to knock off and pick out the charred wicks piecemeal. In all cases where the apparatus is illuminated by a single central burner, a spare burner trimmed and ready for lighting should be kept in the lightroom, with coupling-plyers, so that it may at once be applied should anything go wrong with the burner, and the Liverpool or temporary lamp should also be kept trimmed and in good burning order, in case anything should interrupt the working of the pumps. In preparing the wicks for lighting, they must be cut perfectly smooth and level; and after being used a night, the charred part must be cut away before they are relit.

In making new pump-leathers for the mechanical lamp, the following directions must be attended to:—Before placing the skin in the press, cut a piece $10\frac{1}{2}$ by $3\frac{1}{2}$ inches, and steep it in colza oil for an hour. Then, after cleaning it by a light rub on both sides with cotton waste, press it in the usual manner, taking care to punch it accurately for the screws of the press. Bring down the press very slowly and equally over all—not less time than one hour should be taken to bring down the press; thereafter the skin should be allowed to remain one hour in the press before it is finally placed in the chambers.

MACHINERY.

In all Lighthouses where machinery is employed to propel revolving lights or to work mechanical lamps, it should be kept scrupulously clean, and all working surfaces should be regularly and carefully oiled.

If the machine does not go well, and there is no very obvious cause, it will generally be found that the end of the fly-shaft or its footstep is “cutting.” The footsteps are easily shifted, and the fly-shaft can generally be smoothed on the oil-stone; but if it be much injured, the spare one should be put in and the damaged one sent to a proper workman.

WINDOWS.

The windows of the lantern should be regularly cleaned every day, and washed with water when necessary, to remove sea-spray or other obstructions to the passage of the light, and for the same reason they should be rubbed during the night when they become obscured by condensation or “sweating.” The Keepers should take care, by opening doors or otherwise, to admit a sufficient supply of air to insure the proper burning of the lights and prevent condensation. The storm-panes should always be kept in readiness for immediate use, in case of accident.

D. & T. STEVENSON,
Civil Engineers, Edinburgh.

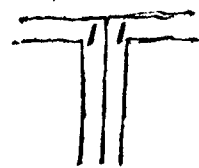
top, as also their running pieces on cornice

15

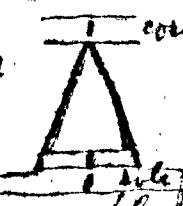
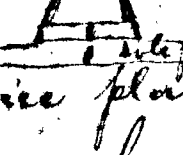
Instructions for fitting up Lantern
and apparatus for Cochran and
Hooper Island Lighthouses

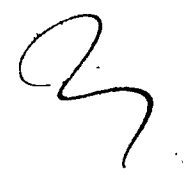
By
Q. J. Stevenson C.E. Edinburgh

Before beginning to fit up the lantern
it is desirable to unpack all the boxes
and arrange them in the order of the
following marks.

Lighthouse. The plates are marked with
figures on the inside of the flanges of joints
thus  and so on.

Sole plate of Lantern. The sole plates of lantern
are marked on the inside 1, 2, 3 & 4, corresponding
marks being made on the lightroom plates.

Sash frames. The sash frames are
marked at top & bottom thus  cornice
marks so correspond being  sole plate
made on the sole & cornice plates.

Rafts & Ridge covers. Are marked
on palms at lower end and T at
top, as also their fitting pieces on
cornice 

cornice and top ring.

Roof plates are marked at top & bottom having corresponding marks on cornice plates & top ring.

Hemispheres of Dome Ventilator - are marked on the supporting palms having corresponding marks on the ribs.

Blinds The plates for fixing blinds are marked and have corresponding marks on cornice - the springs for rollers are on their places.

Ventilators in lightroom The ventilating boxes are marked & have corresponding marks on the lightroom plates.

The lower flanges of the lightroom plates are to be bedded on the top of the tower in red lead putty and the joints of the plates should be filled with rust cement from the inside a space having been left for this purpose; the edges & fitting strips of the side flanges should be coated with white lead before being put together.

The sole plate of the lantern to be bedded on the top of the lightroom with

with red lead putty and the astragals bedded on the sole plate in a similar manner. The rafter covers of roof should also be bedded in putty.

Four ventilators have been supplied. These are to be fitted on the lightroom plates at marked holes being cut in the wooden lining when it is erected for the bundles.

The lining should be of well seasoned timber of a quality suited to the climate.

In glazing the lantern the panes which have their points downwards should be packed or propped up nearly as high as they can go by slips of lead put under the points as otherwise from their triangular form they would jam in the frames and would run a great risk of being broken by any great variations of temperature. Care should be taken while glazing that there is no damp on the glass or astragals. The brass slips for holding in the panes are to be bedded in putty before

before being screwed up. Care should also be taken in putting the lantern together that the surfaces are all dry before applying the putty.

Apparatus for Bochin

The apparatus consists of a fourth order fixed light to illuminate 240° and is to be placed on the table pillar in case No 21. Three lamp fountains have been sent. The fountain is hooked on the apparatus framing on the blank side hooks being placed on the apparatus framing for this purpose.

Apparatus for Hope Island!

The apparatus is a 4th order revolving light. The machine is in box No 20 and is in one piece, and the enclosed sketch shows the lowest piece of the apparatus and the revolving carriage on the top of the machine case, so that no difficulty will be experienced in fitting the whole in the light room.

The

The lamp fountain in this case is placed on the top of the apparatus, has a tube attached to it which leads to a constant level fountain kept into which this tube fits and are fixed on the setting of the apparatus. The fountain can be filled by turning round the slide at bottom of tube which will shut off the oil, then remove the screw on top of fountain. When the fountain has been filled the top screw should be carefully screwed home. The constant level fountain will take its own place by screwing home the fixing screw of connecting tube into setting of apparatus.

The height of the top of burner is marked on the brass setting of the fixed and revolving apparatus, and in replacing burners care should be taken that this height is strictly adhered to.

Dr. J. Thomson

Instructions for
fitting up Lighthouse
Apparatus for Lochin
* To the Island
Lighthouses.

1866

0213376/16

2

0722

23

Specification of Cast-iron Lightroom
and Standard for Hope Island and
Lochin Lighthouses.
By
James Stevenson Civil Engineer,
Edinburgh.

Lightroom

The lightroom which is to be octagonal
in plan, is to be constructed according to the
form and dimensions shown on the
accompanying drawing, No. 1 and described in
the following specification.

It is to consist of cast-iron plates
measuring 3 feet in total height and 6 feet
9 inches in external diameter. The plates are
to be 2 inches thick and to have flanges $\frac{3}{4}$
inch thick and 4 inches broad, except the
upper flange which is to be 6 inches broad.
The whole of the plates are to be strengthened
by angular brackets of the same thickness
as the plates in the manner shown.

The whole of the plates are to be
cast perfectly fair and smooth in the
skin

Casting &
fitting of plates

skin, nor plugging, such as iron, or other material, being allowed. Each plate is to have fitting strips $\frac{1}{4}$ inch broad all round its outer edge and across the flanges at the edges. And at each bolt hole, fitting strips are also to be formed across top of upper flange to suit those on under side of sole plate of lantern. A space of $\frac{1}{4}$ to $\frac{3}{8}$ of an inch is to be left for suit between the flanges.

The plates are to be connected together by $\frac{3}{4}$ inch bolts. Two of the bolts in the vertical joints of each pair of plates are to be carefully turned with a slight taper, and fitted into widened holes, the heads and nuts also to be fitted to bear close throughout. The other bolts are to be carefully forged and fitted so that the heads and nuts shall bear fairly. The lightroom is to be fixed to the tower by one bolt in each plate 4 inches long and $\frac{1}{8}$ inch screw properly detailed. The bolts to be of BB Glasgow iron.

The

Bolts & nuts

not to be
put in

lightroom
door

lumber
lining

Sole Plate.

The lightroom door is to be made of malleable iron $\frac{1}{4}$ inch thick, strengthened by a bar passing all round it $1\frac{1}{4}$ inch square. The edges of the door are to be filed and fitted to the strips which are to be cast in the door cheeks as shown on the plan. The door is to open outwards, and to be furnished with strong brass hinges and lock made to directions and paid for as extra work.

The lightroom is to be lined with boarding $\frac{3}{4}$ inch thick, in breadth not exceeding 42 inches, and grooved & feathered, and beaded on the joints. This boarding is to be nailed to bond timbers ~~the~~ of jammed in between the metal & lining, and to be $1\frac{1}{2}$ inch thick. This lining is not included in the contract.

Lantern.

The sole plate is to be cast in four pieces fitted and joined together by two $\frac{1}{2}$ inch screws in each joint & fixed down to lightroom by one $\frac{1}{8}$ inch

the inside screw bolt in each side; the ends of
the different pieces are to be thickened as
has been shown and to receive this additional thick-
ening depression are to be formed in upper
flange of lightroom.

The sash-frames are to be made of sash-frames
are of the form and dimensions shown. Each
sash frame is to be fixed to the sole plate by
three 5/8 inch screws. The glass sashes are
to be of brass of the size and section
shown and to have not less than
1/4 inch hold of the glass, and are to be
bolted to the sash frames and cornice by
five 3/16 inch brass screws in the sides
and 4 at top or bottom of each pane.
The lower side of sash frames to
also have fitting strips, one at each
side hole and at each end.

The cornice is also to be cast in
four pieces forming an eight-sided polygon
It is to be of the form and dimensions
shown, carefully fitted at joints fixed to the
sole plate at top of each sash frame by
two 5/8 inch screws, and the castings
are to be connected with each other at
the

the overlaps by two 1/2 inch screws. At the
four solid angles of the cornice iron water
pipes 1 inch diameter of No. 21 wire gauge
copper are to be fitted as shown. These
pipes are to be let down one side of a
sash frame and are to be fixed thereto
by two clips of No. 17 wire gauge copper.
They are to be bent to discharge
over the edge of the sole plates to
which they are also to be secured
by a double clip. The cornice is to
be recessed to flush the cast iron rafters
hereafter specified which are to be fixed
to it with two 1/2 inch screws in each.

Rafters.

The rafters, which are to be of cast
iron, are to be eight in number for the
lantern of the form shown in the section.
They are to be fitted at the bottoms to the
recess in the cornice plates, at top they
are to have T formed heads and to be
fixed to the top ring by two 5/8 inch screws
in each rafter. The top ring is to be of
good malleable iron of the form and
dimensions shown and in one piece.

Roof Plates.

The roof plates are to be of the
best

best galvanized charcoal iron; the plates of the outer roof to be No. 14 wire gauge; the plates of the inner roof to be No. 17. The plates of the outer roof are to be fixed to the rafters by $\frac{5}{16}$ inch countersink screws to the cornice by similar screws, with round heads, all 2 inches apart, and to the malleable iron top ring by a $\frac{1}{2}$ inch copper bolt in each plate which will also pass through the inner ventilator and the inner dome, and by the bolts which secure the top of the ridge covers as hereafter specified. The plates of the inner roof are also to be secured to the rafters and to the cornice plates by $\frac{5}{16}$ inch round headed screws about 4 inches apart.

Ridge covers are to be made as shown. They are each to be fixed to the rafters by four $\frac{5}{16}$ inch screws, and at the top they are to be bolted to the malleable iron ring by a $\frac{1}{2}$ inch iron bolt which is to pass through the ridge cover, inner ventilator, roof plates and ring, and bind all firmly together.

The

Ventilator.

The ventilator is to be made as shown in the drawings, and of the best sheet copper of the weight of 32 lb. per superficial foot. The inner ventilator is to be carefully soldered at all joints and to be finished at the bottom to fit the cone of the top ring to which it is to be secured by the copper and iron bolts already specified. The hemispherical cap is to be raised out of one piece, and it and the outer ventilator are to be rivetted to the copper straps measuring $1\frac{1}{4}$ inch by $\frac{1}{4}$ inch, which are to be bent at foot to fit the angle of the outer roof plates to which they are to be afterwards rivetted.

Glass

It is

Storm panes.

The lantern is to be glazed with plate glass of the best quality of polished plate, not less than $\frac{1}{4}$ inch nor more than $\frac{5}{16}$ inch thick. A reserve of six panes also to be furnished. The glass is to be free of striae, airbells, and other blemishes, and both faces are to be strictly parallel. Two storm panes glazed, are to be furnished similar to a pattern. Two sets of spare glass are also to be furnished.

furnished for each. The lantern is to be fitted with blinds of good unbleached linen mounted on the best spring rollers. They are to be mounted so that when down they may hang close together with the cloth of each blind overlapping that on each side of it 1 inch.

All the cast iron work is to be left as cast, the surfaces being clean and sharp in the angles; except all fitting surfaces, which are to be carefully chipped and filed. The brass ships are to be filed on the edges and fitting surfaces. All bolts and nails to be turned, and all nuts to have countersink heads, except those otherwise drawn or specified.

The whole of the iron work of lightroom and lantern is to receive 3 coats of red lead paint.

The whole of the work to be done to the entire satisfaction of Messrs David and Thomas Stevenson, Civil Engineers, who are to have the power of rejecting materials

Blinds.

Painting.

materials or workmanship which in their opinion do not fulfil the terms of the Specification. The price for the lightroom and lantern to include fitting up at the workshops of the contractor and packing for transmission to India and delivery at a Railway Station.

The whole to be completed within 4 months from the date of acceptance of the offer, but if not completed within that time the contract price shall suffer a reduction at the rate of £1 Sterling per day for each day after the time stated.

Should any dispute arise between the contracting parties as to the quality of the material, the workmanship, time of completion or as to the true import and meaning of this specification, and the plans or drawings relative hereto, the same shall be and are hereby referred to the said Messrs David & Thomas Stevenson whose decision shall be final and binding on all parties.

Edin. 6 Sept. 1865.

(Signed) D. & T. Stevenson

223376/88

24/7

Specification of Carbs
Lanterns for Hope
Island and Cochin
Lighthouses

W. Stevenson
6.6.66
1866

Pres. 30 Aug 1866

N. 3205

33

From
The Superintendent of Marine
To
The Secretary to Government
of the Department

Sir
Referring to the Proceedings of Government
Marine Department of the 27th ultimo, N. 182,
I have the honor to forward the plans of the
Cochin and Hope Island Light lanterns with
the Instructions for fitting them, and specifications
of the light rooms. They are submitted with
a view to their being furnished through your
Department to the officers in charge of the
districts in which the lights are situated.

2 It will be necessary that an estimate
be framed of the expense that will probably
be incurred in fixing the new lantern on
the Hope Island light house.

I have the honor to be

Madras
Marine Supdt's Office
14th August 1866

Sir

Your Most Obedt. Servant

W. H. H. H.
Superintendent of Marine

2200 August 1866 A. 2105

2200

2200 August 1866 A. 2105

Towards the place on the
beach and the island
light house with the
instruction in future new
and specification of the
light house.

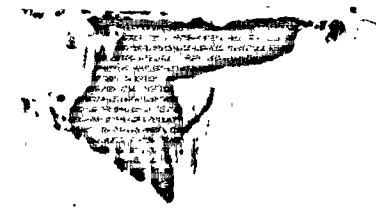
2200 August 1866 A. 2105

2200 August 1866 A. 2105

2200 August 1866 A. 2105

2200 August 1866 A. 2105

2200 August 1866 A. 2105



2200 August 1866 A. 2105

Public Works Department.

35

2200 August 1866 A. 2105

Proceedings of the Madras Government
Under date the 30th Aug 66
Read the following

From
The Superintendent of
Marine - (N.S. N^o 3205 dated 14th August 1866)

A copy of each of the papers
received with the foregoing
letter will be furnished
to the Superintending Engineer
of the 1st and 7th Divisions in
continuation of the orders of
Government N^o 2454 dated
the 4th August 1866

The Supt Engineer of the
1st Division will submit at
an early date the required
estimate for fixing the
new lantern on the Hope
Island Light House -

The Supt Engineer of the 1st and 7th Divisions
will be required to submit
the Main Report

Despatches 31st Aug 66
Plans despatched to the 1st and 7th Divisions
Plans despatched to the 1st and 7th Divisions

40

2200 August 1866 A. 2105

26
2 WWS 20th
Pro. of Govt for August

At 27/4
Pro. of the Madras Govt
Of 30 August 1867

At 675. 676.

166
August 1866