

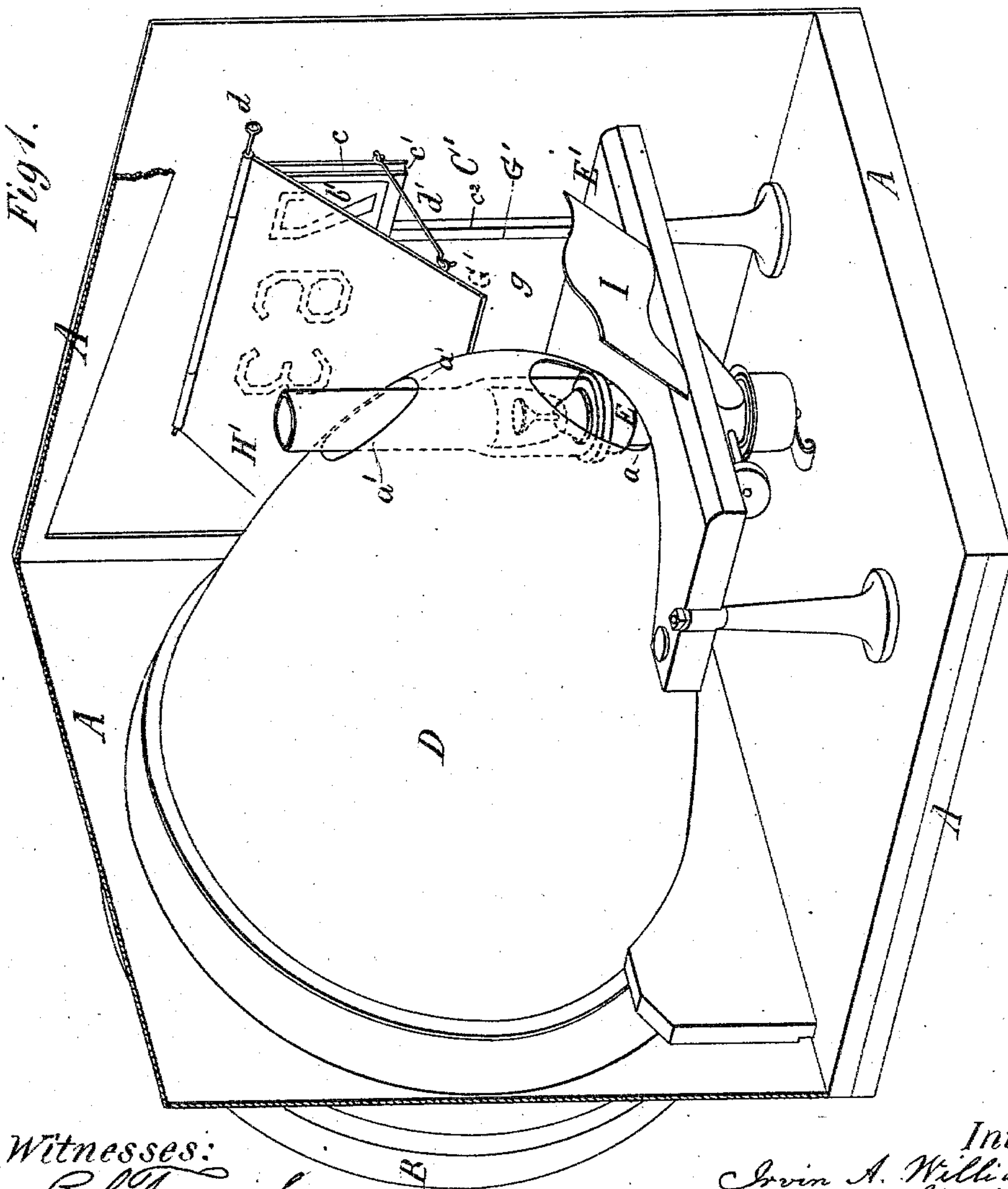
(No Model.)

7 Sheets—Sheet 1.

I. A. WILLIAMS.
LOCOMOTIVE HEAD LIGHT.

No. 305,872.

Patented Sept. 30, 1884.



Witnesses:

B. C. Fenwick.
Robt. L. Fenwick.

Inventor:

Irvin A. Williams
by his Attys
Fenwick & Lawrence

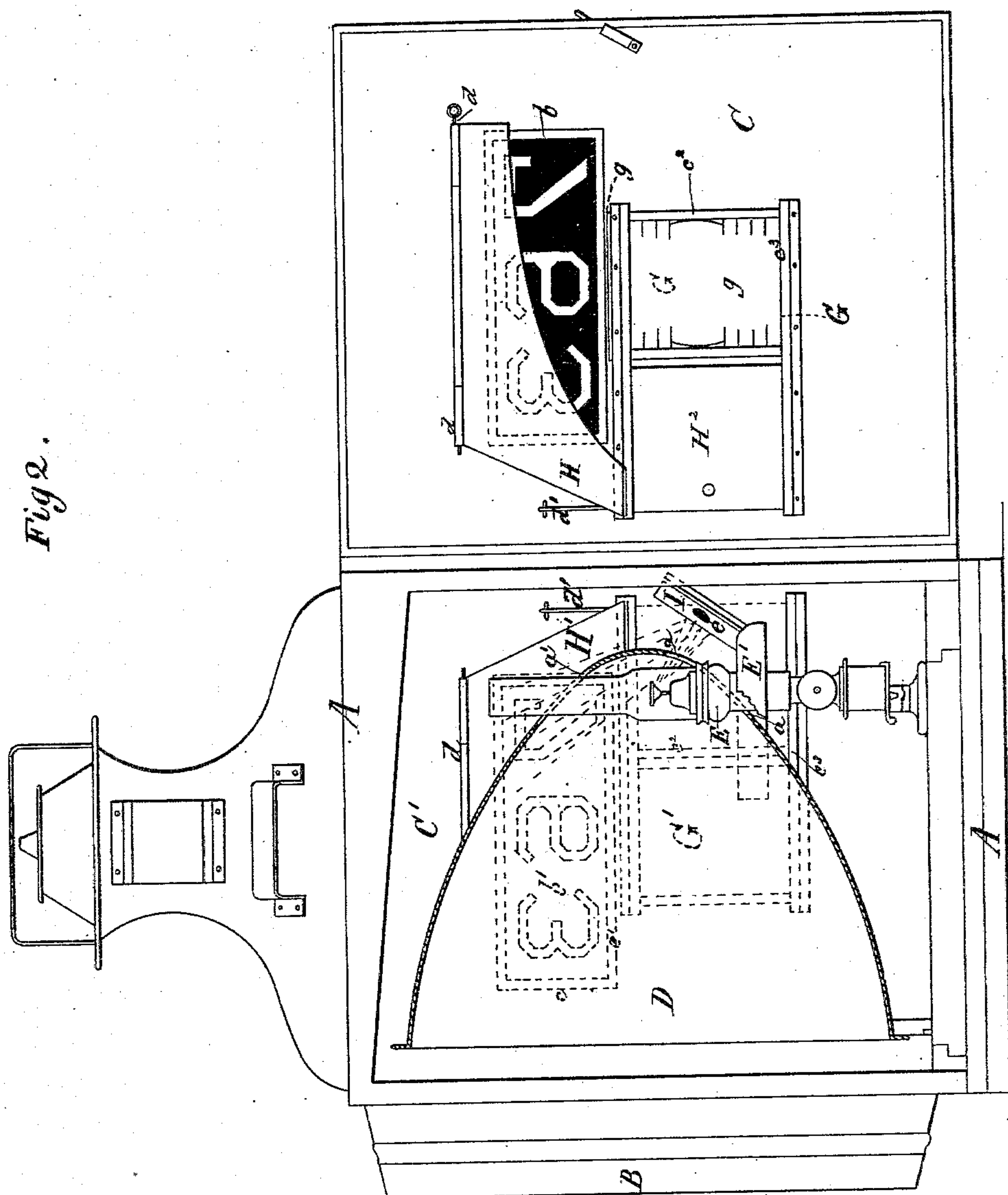
(No Model.)

7 Sheets—Sheet 2.

I. A. WILLIAMS.
LOCOMOTIVE HEAD LIGHT.

No. 305,872.

Patented Sept. 30, 1884.



Witnesses:

B. C. Fenwick.

B. C. Fenwick.
Robt L. Fenwick.

Inventor:

Irvin A. Williams

by his atty

Fenwick^d Lawrence

(No Model.)

7 Sheets—Sheet 3.

I. A. WILLIAMS.
LOCOMOTIVE HEAD LIGHT.

No. 305,872.

Patented Sept. 30, 1884.

Fig 3.

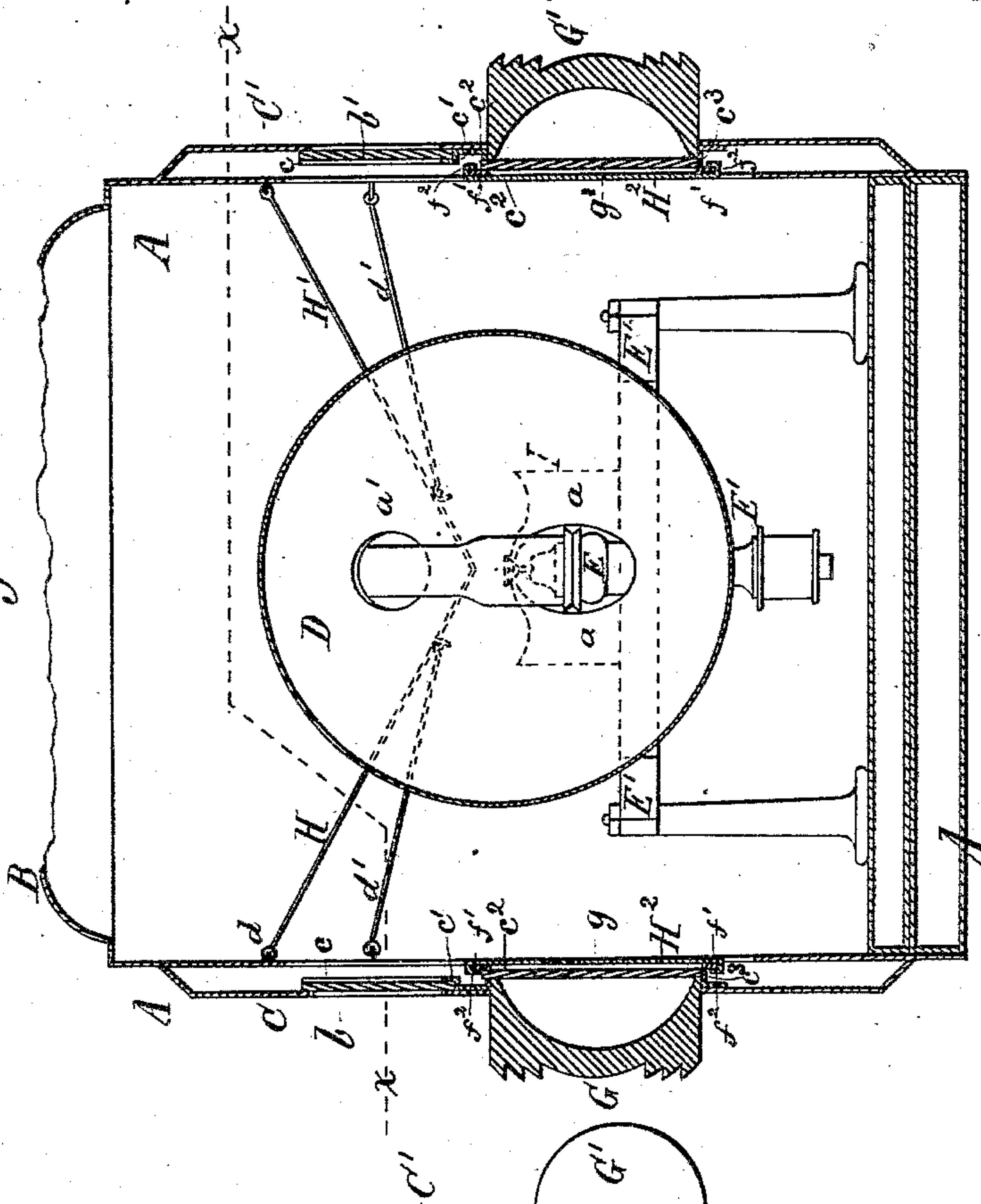
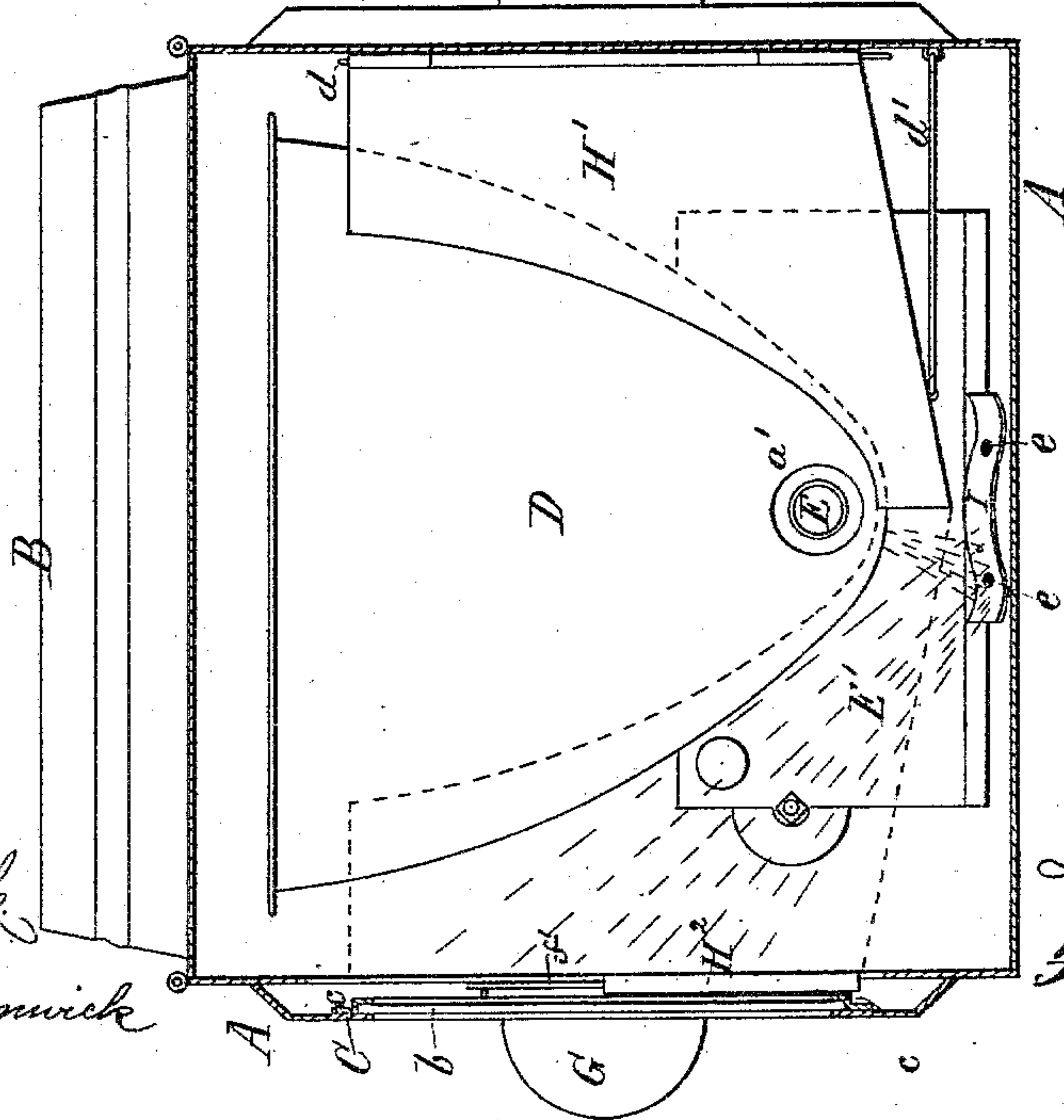


Fig 4.



Witnesses:

W B Fenwick

Robt L Fenwick

Inventor:

Irvin A. Williams
by his Atty
Fenwick & Lawrence

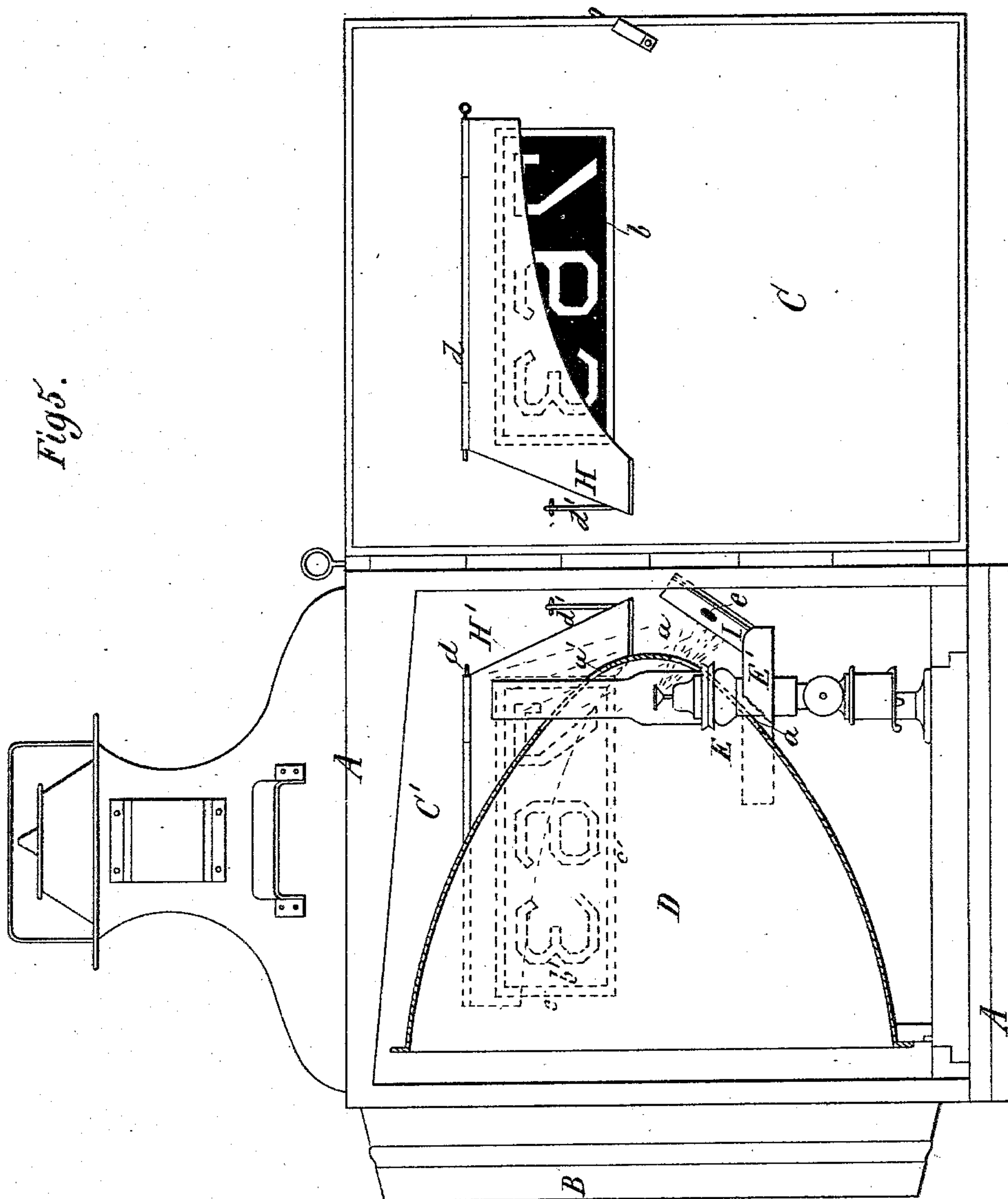
(No Model.)

7 Sheets—Sheet 4.

I. A. WILLIAMS.
LOCOMOTIVE HEAD LIGHT.

No. 305,872.

Patented Sept. 30, 1884.



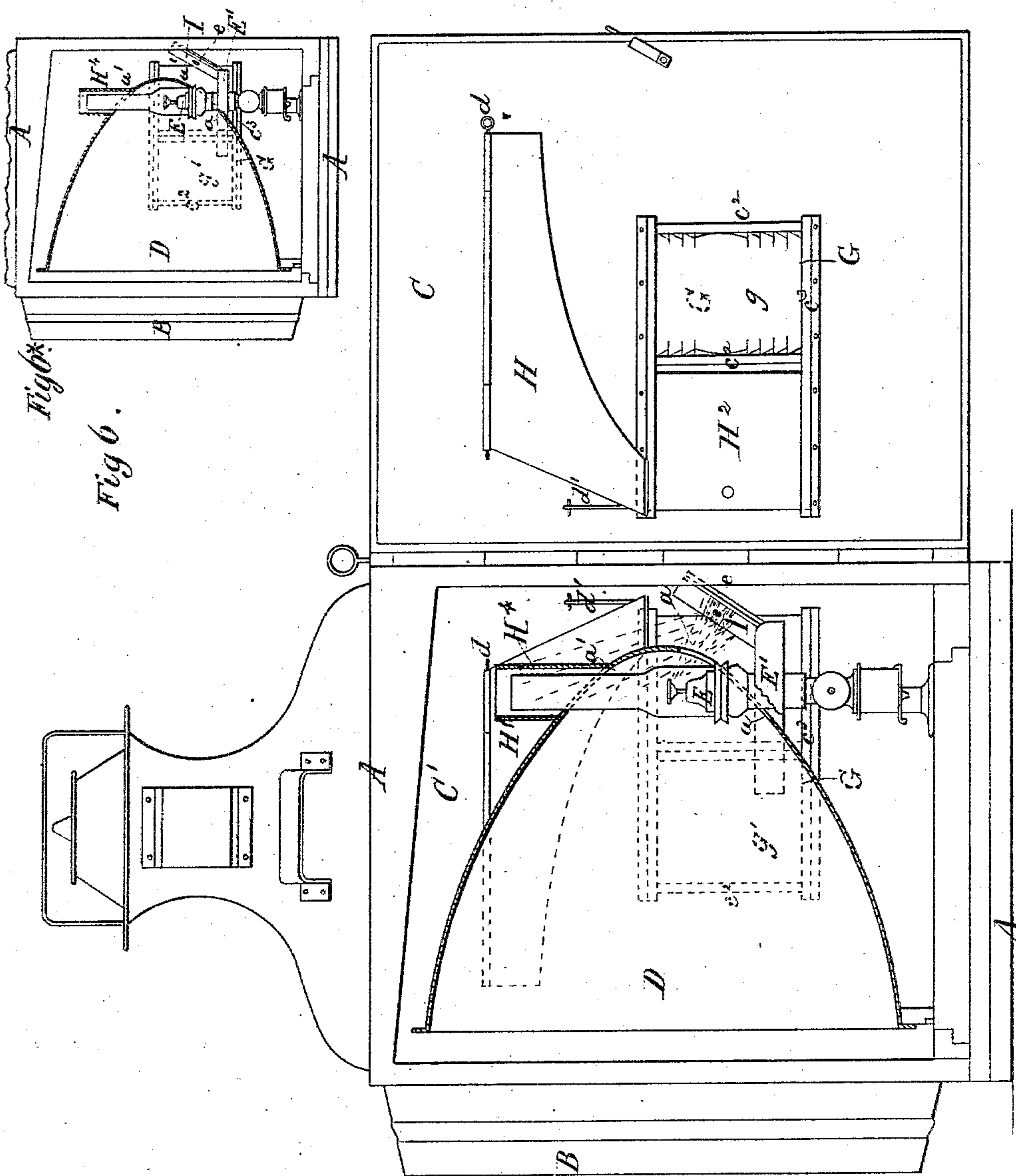
Witnesses:
B. C. Fenwick
Robt. L. Fenwick

Inventor:
Irvin A. Williams
by his Atty
Fenwick & Lawrence

7 Sheets—Sheet 5.

No. 305,872.

Patented Sept. 30, 1884.



Witnesses:

B. C. Fenwick.
Robt L. Fenwick

Inventor:

Irvine A. Williams
by his Atty
Genwick & Lawrence

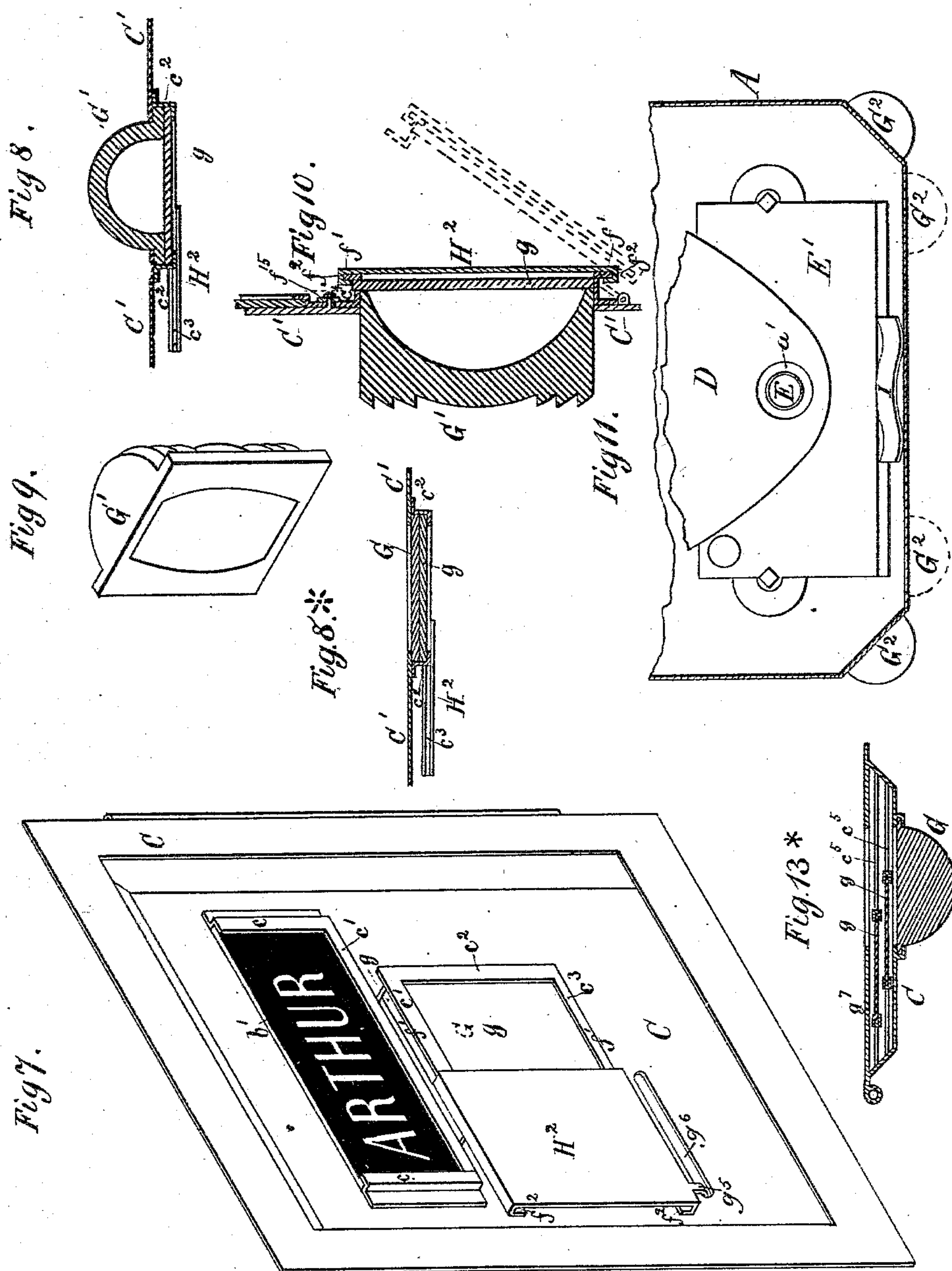
(No Model.)

7 Sheets—Sheet 6.

I. A. WILLIAMS.
LOCOMOTIVE HEAD LIGHT.

No. 305,872.

Patented Sept. 30, 1884.



Witnesses:

B. C. Fenwick
Robt. L. Fenwick

Inventor:

Irwin A. Williams
by his Atty
Finwick & Lawrence

(No Model.)

7 Sheets—Sheet 7.

I. A. WILLIAMS.
LOCOMOTIVE HEAD LIGHT.

No. 305,872.

Patented Sept. 30, 1884.

Fig. 13.

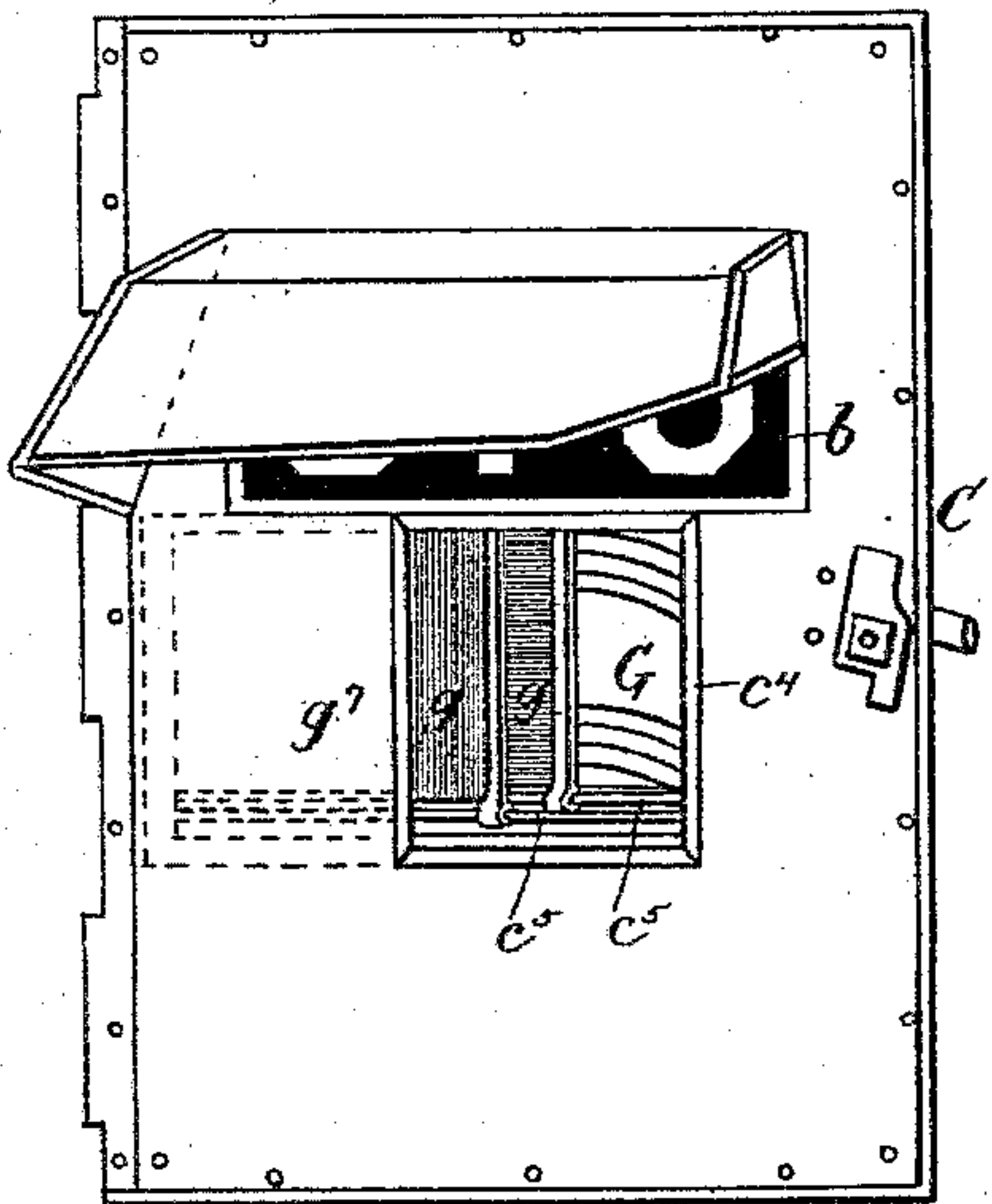


Fig. 12.

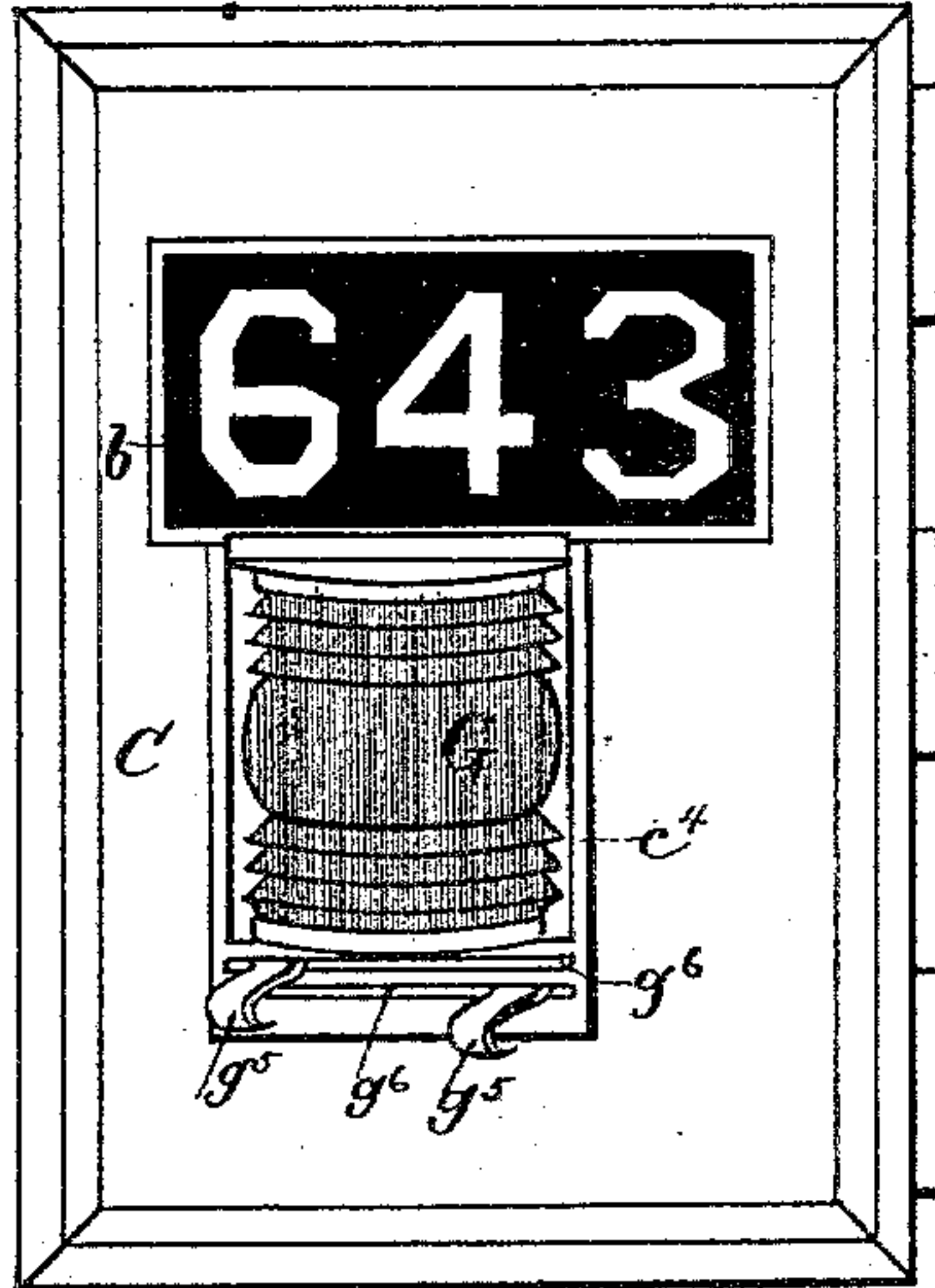


Fig. 15.

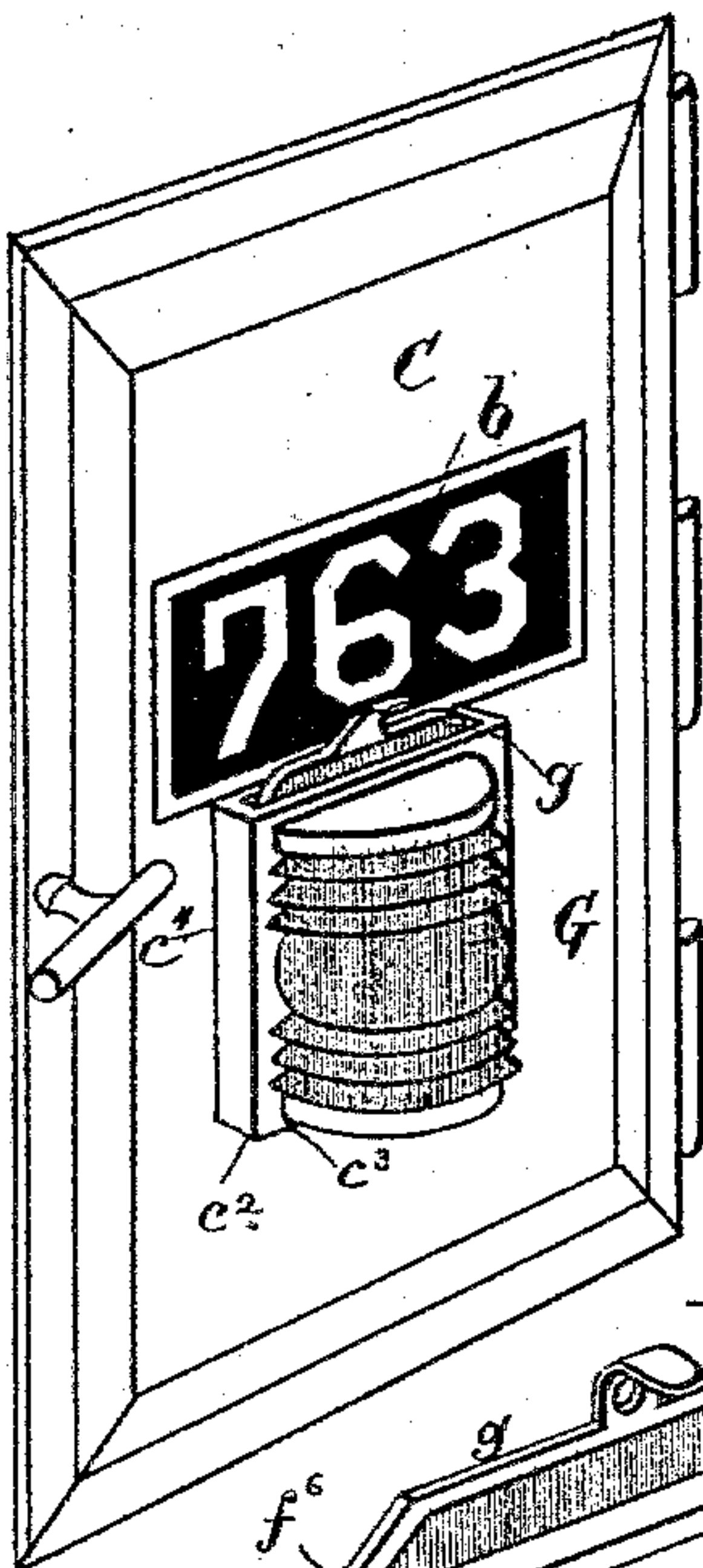


Fig. 17.

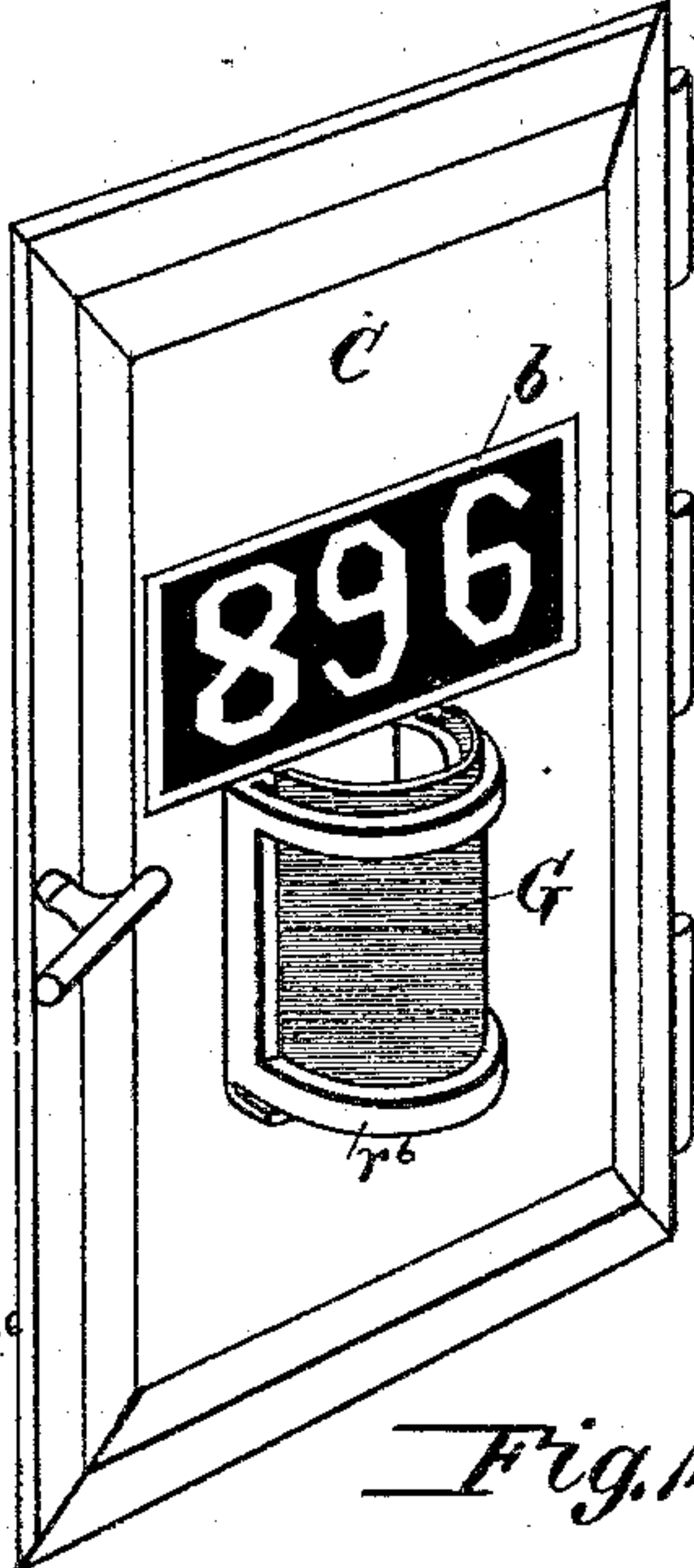


Fig. 18.

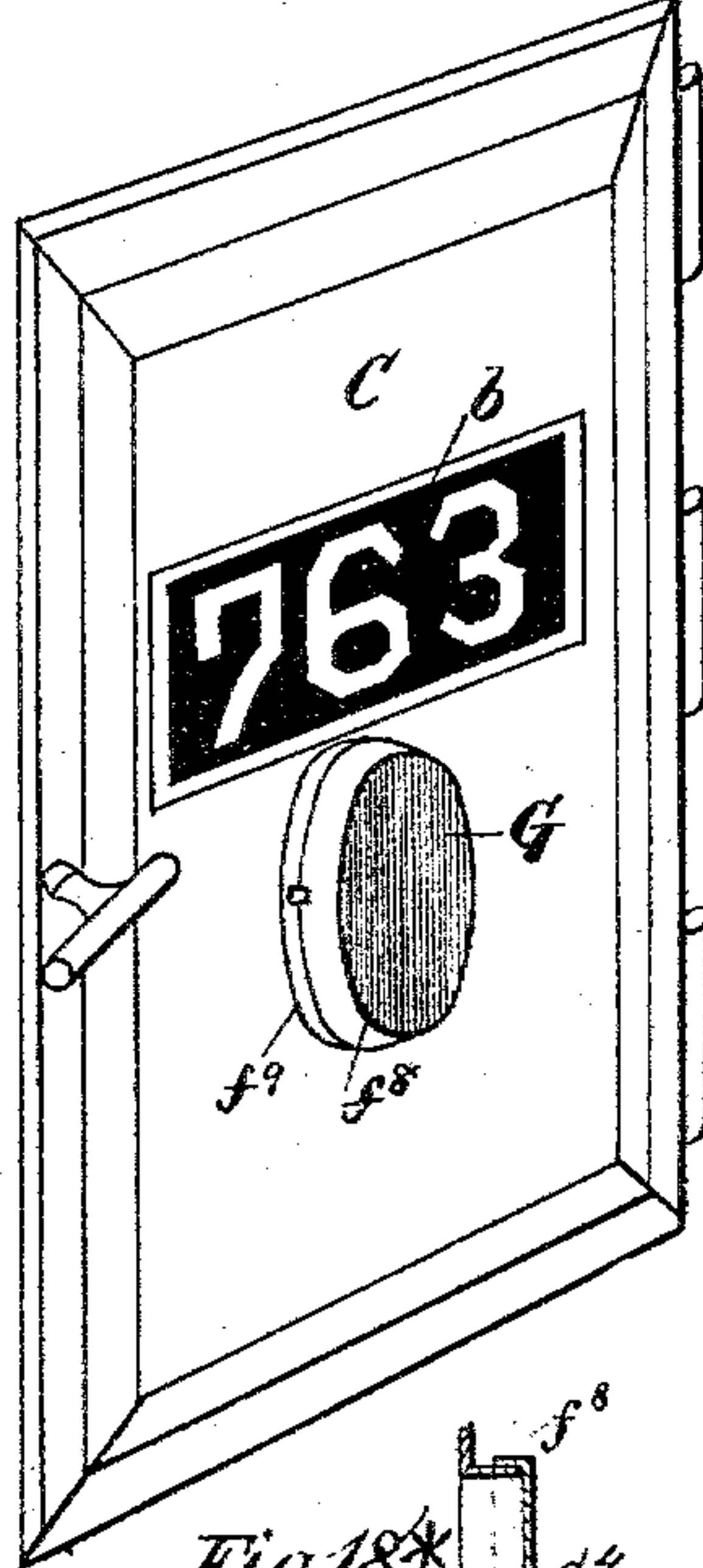


Fig. 16.

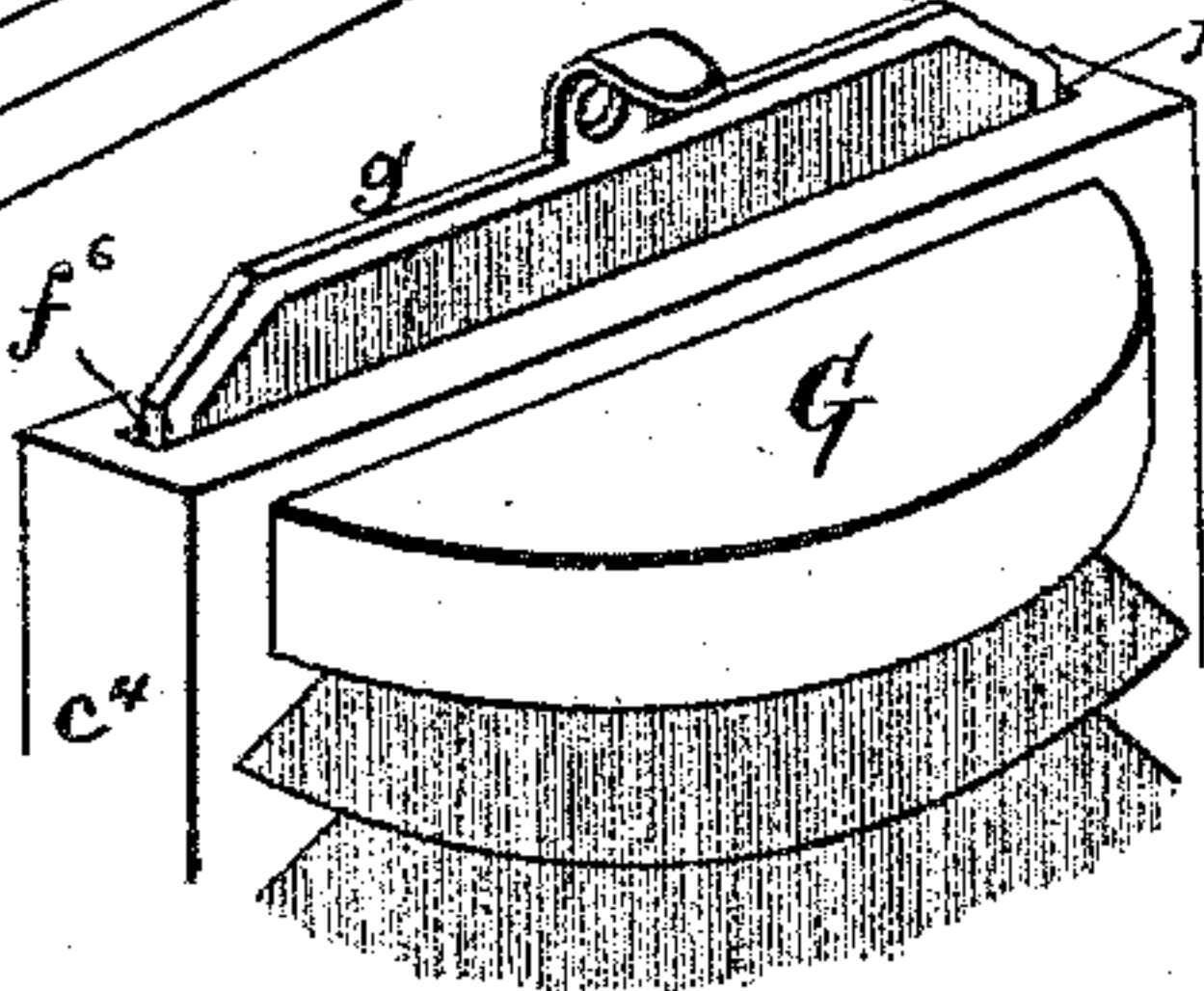


Fig. 14.

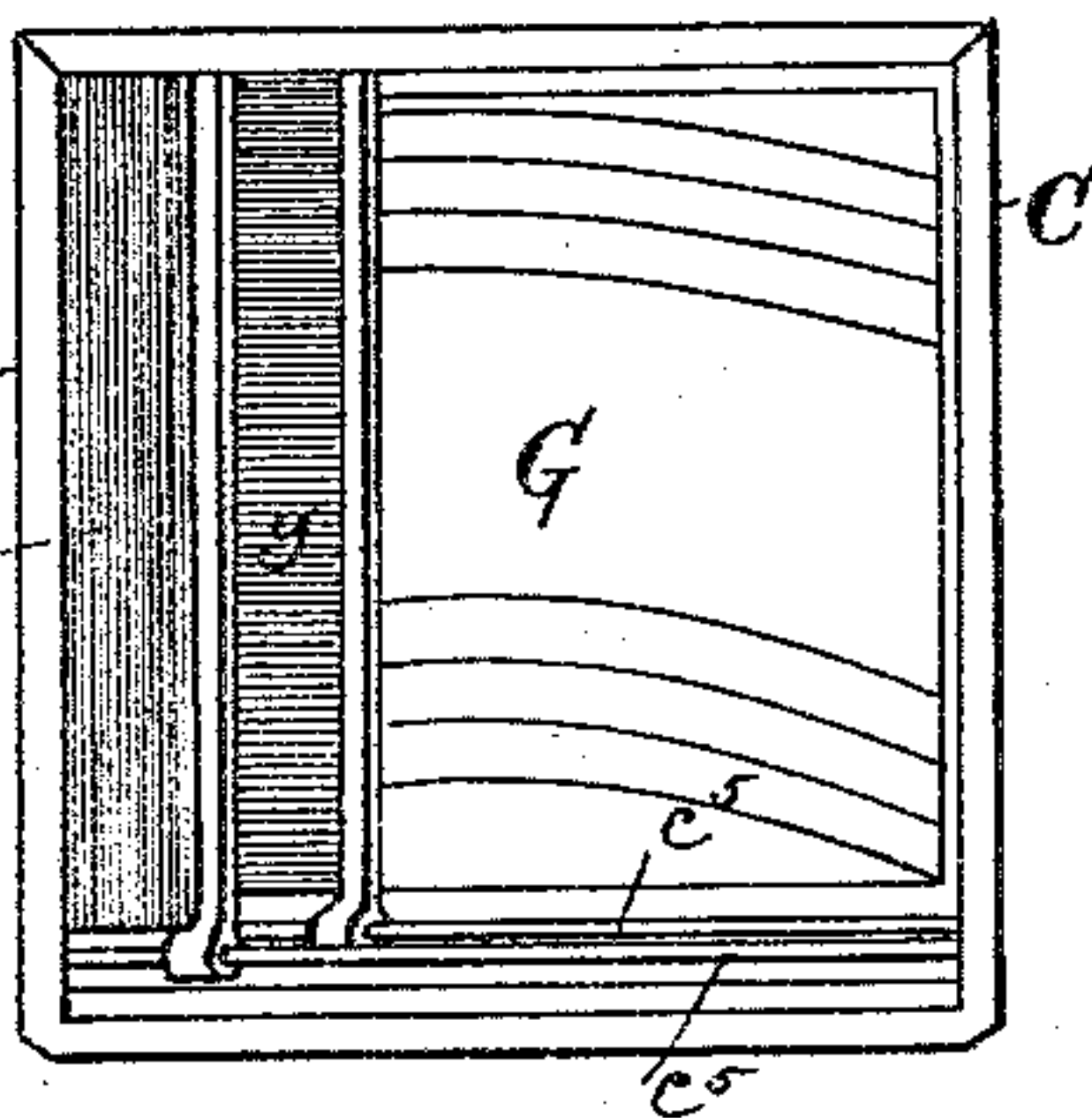
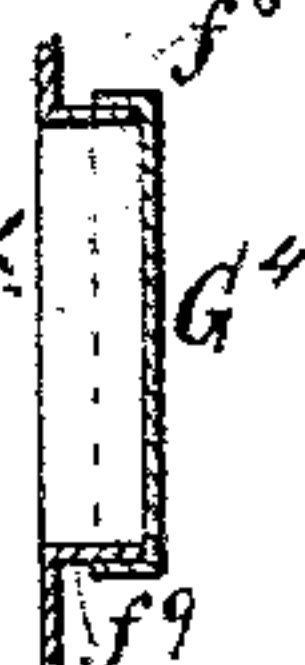


Fig. 18.*



Witnesses:

B. C. Fenwick.
Robt. L. Fenwick

Inventor:

Irvin A. Williams

by Francis H. Lawrence

His Attorneys

UNITED STATES PATENT OFFICE.

IRVIN A. WILLIAMS, OF UTICA, NEW YORK.

LOCOMOTIVE HEAD-LIGHT.

SPECIFICATION forming part of Letters Patent No. 305,872, dated September 30, 1884.

Application filed July 2, 1883. (No model.)

To all whom it may concern:

Be it known that I, IRVIN A. WILLIAMS, a citizen of the United States, residing at Utica, in the county of Oneida and State of New York, have invented a new and Improved Locomotive Head-Light with Signaling or Indicating Attachments, of which the following, in connection with the annexed drawings and letters of reference thereon, is a specification.

My invention relates to improvements in locomotive head-lights whereby they are better adapted for displaying either an illuminated transparent danger or cautionary signal, or the number or name of an engine or train or section of a train, or displaying a combination of illuminated transparent signs—such as both the number and name of an engine and a signal, or the number or name of the engine, train, or section of a train, together with an independently-located danger or cautionary signal—and by these means enable the engineer to display in rear of the front edge or flange of the reflector and on the side or sides of the head-light case such signals or signs, or both, as will show either the number or name of the engine, or both, or the number or name or both of the engine, train, or section of a train, or other signal of the engine, train, or section of a train in a very distinct manner while moving, and this without lessening, borrowing from, or interfering with the necessarily powerful and direct forwardly-thrown rays of light of the burner and main reflector, which are required to be thrown upon the inner reflecting-surface, and thence through the front of the reflector for lighting up the track ahead.

Attempts have been made to dispense with the use of signal-lanterns usually carried on the front of locomotives on railroads by employing illuminated signals, and number or name indicator-plates on the sides of the locomotive head-light; but objection exists to the means heretofore devised for this purpose on account of the feebleness of the illumination of the signals and indicators, as well as inconvenience of manipulating the same; and to overcome these objections and improve and enhance the utility of side signaling and indicating head-lights is the object of my invention, which consists in certain novel construc-

tions and combinations of parts as herein-after described and specifically claimed.

My invention has special reference to running night trains on railroads, although it is not confined thereto. In running such trains it is a matter of great importance that the employes, telegraph-operators, or conductors shall know whether engines, trains, or sections of trains approaching or passing them are or not certain engines, trains, or sections of trains specified in their time-tables or schedules or telegraphic orders; and it is also essential that the engineer of a train shall be able to indicate promptly to an engineer of an approaching train whether his train is on a main track or on a "siding;" or, in other words, it is important that engineers may be able to make all the signals of the road from their head-lights without the use of signal-lanterns, usually carried on the front of locomotives, and without materially diminishing the light necessary for the illumination of the track or interfering with the indications usually made by the ordinary indicator or number or name plates.

In the accompanying drawings, Figure 1 is a broken sectional perspective view of a head-light or reflector case for a locomotive, illustrating my invention. Fig. 2 is a side view of a head-light or reflector case with its signaling side door shown opened, and with its reflector shown in section, while all the other parts are in elevation. Fig. 3 is a vertical section of the head-light looking toward the burner, the reflector being shown in elevation. Fig. 4 is a horizontal section, in a line above the reflector and signaling devices, on one side of the center of the head-light and above the reflector on the other side of said center, and through a signal-glass which carries either a name or a number, as indicated by the line *xx* in Fig. 3. Fig. 5 is a modified plan of Fig. 1, and Figs. 6 and 6* are modified plans of the same, showing a shield or tube around the upper part of the glass chimney. Fig. 7 is a perspective view of parts of Fig. 1, showing more clearly the manner in which the plates for carrying either a number or a name and the signal-glasses are fitted upon the door or side of the head-light case, also showing the sliding cover for shutting off the light from

the signal-glasses. In connection with the construction of the sliding signal-glasses and the sliding covers shown in this figure, a head-light case provided with apertures for the sliding signal-glasses and the sliding covers to be inserted through and manipulated from the outside of the case may be provided, as illustrated in I. A. Williams's and C. I. Williams's patent of July 17, 1883, and in Figs. 15 and 16. Figs. 8 and 8* are detail horizontal sections of a portion of a side of a head-light case with signal-glasses set in the same. Fig. 9 is a perspective view of a bulging hollow signal-glass or compound lens which may be used. Fig. 10 is an enlarged sectional view of the signaling-door of the head-light case, showing more clearly how the different-colored flat glass signals can be moved up or down past the glass having a name or number upon it, also showing the manner in which the lenses or analogous signals are removably fastened in position. Fig. 11 is a horizontal section of the head-light case, showing my improved auxiliary reflector, the burner, and a portion of the main reflector, and also illustrating by full black lines how lenses may, if found useful, be placed in the rear corners of the case, and by dotted lines in the back of said case. These lenses in this illustration may be used, when necessary, with the main lenses, which are in the sides of the case; but their illumination will be only slight, as they depend upon such light as is incidentally diffused in the reflector-case and not reflected upon the main signals and indicator-plates. Fig. 12 is an outside elevation of one side or door of my signaling head-light, with a modified arrangement of the movable colored signal-glasses, whereby they are operated by handles on the outside of the case. Fig. 13* is a horizontal section of Fig. 13; Fig. 13, an inside elevation of the modification shown in Fig. 12. Fig. 14 is an enlarged perspective view of Fig. 13. Fig. 15 is an outside perspective view showing another modified arrangement of the movable colored signals. Fig. 16 is an enlarged perspective view of a portion of Fig. 15. Fig. 17 is an outside perspective view of a door or side of a case, but showing a modified arrangement of the convex lens, and Fig. 18 is also a perspective view similar to Fig. 17, but showing a modification of the signals. Fig. 18* is a detail section of the signal shown in Fig. 18, with an opaque cap placed in front of it.

In the accompanying drawings, A is the head-light or reflector case, formed with the usual circular projecting front portion, B, which contains the large central front glass through which the great volume of light from the burner and main reflector passes to light the railroad-track ahead of the locomotive, and with a side door, C. This case in the drawings is shown as formed with another door, C', but in practical use the portion C' is, as usual, made a fixture, or forms a permanent side of the case, and the reflector with its sliding base or support will be drawn out of the case in

the usual manner, or as described in my Patent No. 235,924. Within this case are arranged, in the manner shown, or in any other suitable manner, a main reflector, D, having a burner-opening, *a*, and chimney-opening *a'*, and a burner, E, connected with an oil-reservoir, E'.

The reflector, in order to give the most beneficial results, should be in the form of a paraboloid, or of equivalent suitable shape. The burner-opening *a* therein should be of substantially the form shown, or of an equivalent form, and should be located below and forward of the apex of the said reflector in order to have the light of the burner largely exposed to view from the rear and outside of the reflector, or to allow light from the burner to pass downward and sidewise out of the reflector D into the reflector-case, and also to permit, when the chimney is adjusted from its seat, the burner to be lighted while within the reflector-case, as described in my Patent No. 235,924.

In the side door, C, and side C' of the head-light case A openings are formed, and in these openings flat plates *b b'*, of glass or other transparent light-transmitting material, are placed, they being fitted in guides and on rests, as *c c'*, so as to be removable when it is necessary to substitute for them other plates of different character. These plates *b b'*, respectively, are to have either the name or number or other indicator-symbol of an engine or a train marked on, cut in, or affixed to them in any suitable manner, as illustrated in the drawings.

G G' are transparent signaling-glasses or other equivalent light-transmitting devices. These signals may be of white or colored glass, and, as different-colored signals are to be displayed, these colors may be white, red, and green. The location of these signals is preferably below the name or number plate signals *b b'*, and the best form for them is the hollow bulging one shown in Figs. 3 and 10; but the location and form of the signals G G' may be changed without departing from my invention, provided in all cases the signals and number-plates are set in separate openings and on the sides of the head-light case in rear of the front edge or flange of the reflector. These signaling devices G G' are also placed in openings formed, respectively, in the door C and side C' of the case A.

The "Fresnel" form of glass signals G G' represented has been found to be very effective for signaling purposes, as it is more attractive when illuminated, on account of the large surface afforded by it for diffusing the light from the burner of the head-light; and while it is preferred by me over any other known form of construction, my invention is not limited to such form of signals any more than to the precise relative location of the same to the indicator-plates, as any other suitable form of signal (plain flat glass plates, for instance) may be employed with great benefit

in the door or side of the case. These signals G G' may be permanently set in position, or so fitted in position upon the door C and side C' of case A as to be removable from the same. When the signals G G' are permanently fixed, they will be of white glass or other transparent material, and sliding plates g g' , of glass or other transparent material and of desired colors—red and green, for instance—will be used in connection therewith, and can be applied to the inside of the case or outside of it; but when the signals G G' are removable or changeable, there will be provided for the head-light three glasses, corresponding to that, G , and three corresponding to that, G' , and these glasses will be used as follows: Should a white glass, G , be in use, it will be removed when necessary, and either a red or a green one substituted; or, should a green one be in use, it will be removed and a red or white one substituted for it; or, should a red one be in use, it will be removed and a green or white one substituted for it, and by these means a variety of signals may be produced, as circumstances require.

From the foregoing description of the signals G G' it will be seen that I employ as a means for producing danger or cautionary signals either several separate lenses, G or G' , of the form represented or other suitable form, and which are respectively of white, red, or green colored glass or other suitable transparent material, or signals which comprise a plain white glass plate, or a lens, G , of white glass or other material, and flat plates g or g' , of glass or other suitable transparent material of red and green colors.

The colors of white, red, and green, which I have mentioned above, may be substituted by other colors adapted for giving the desired signals, and the number of colored lenses G and G' , and the number of colored plates g or g' , may be reduced or increased, as deemed necessary. For instance, simply a white and red or a white and green, or simply a green or a red lens, or simply a white lens, G or G' , and a green or a red flat plate, as g or g' , may be provided.

My invention is not confined to special colors, nor to a specific number of different-colored glass signals, whether of lens or flat plate form.

These signals G G' , if permanently applied as illustrated in Figs. 1, 2, 3, 4, 6, 7, and 8, are best made of white transparent material; and on the inside of the door C and side C' of the case A skeleton frames c^4 are provided, which have guides and rests, as c^2 c^3 , for the transparent flat plates g g' , of glass or other suitable light-transmitting material of either red, green, or other desired mixed color to move in, so as to serve for signaling different colors back of the white bulging signal-glasses G G' , or flat plates of white glass, if such should be in use, occupying the places of the signals G G' of lens form. The frames upon which the rests c^2 c^3 are formed are also provided

with guiding-tongues f' , for holding and guiding the grooved sliding covers H^2 f^2 , or other suitable means, which are provided, as shown, for shutting off the light of the burner from the signal-glasses.

When the glasses G G' are removable and several different-colored glasses of the form of G and G' are adopted, the plates g g' need not be furnished with the head-light; and in such construction the glasses G G' will be fastened in position by the frames c^4 , which may be hinged by one edge and clamped by a turn-button, f^{15} , at the other to the inside of the door C and side C' of the case A , as shown in Fig. 10 of the drawings.

The hinged frames will have guiding-tongues f' and sliding covers H^2 f^2 , just the same as the permanently-fixed frames, and for the same purpose, as is illustrated in said Fig. 10 of the drawings.

The flat plate-glass signals g g' , as shown in Figs. 7 and 10, are arranged to slide up and down past the indicator-plates b b' in the guides c^2 , while the covers H^2 f^2 slide transversely on the tongues f' ; but in practice the glass plates g g' may be passed into the case A from the outside through slots, as illustrated in Figs. 15 and 16, and in I. A. and G. I. Williams's patent, dated July 17, 1883. So also may the handles of the glasses g g' and covers H^2 f^2 (see Figs. 7 and 12) be passed through slots in the case and both the plates g g' and the covers be manipulated from the outside of the case by the engineer.

In the modification shown in Figs. 12, 13, and 14 a Fresnel white-glass lens—such as G or G' —is represented, one to be used on each side of the head-light case A ; but a flat white glass may be substituted for the same, as illustrated in Fig. 8*. These glasses are permanently fastened in position and on the insides of the white glasses above and below, and on one side a series of guides, c^5 , are arranged for the colored signals g g' to slide upon, so that by means of handles g^5 , passing through slots g^6 of the door or side of the head-light case, either red or green glasses can conveniently be brought into position behind the signal-glasses G G' , and thus the signals changed when required; or, if desired, the signal-glasses g g' can be moved back and forth, so as to give flashing signals. The handles are attached to the bottom of the respective color-signals, and the slots are cut through the case A on a horizontal plane with said handles. This is the most convenient method, and it greatly facilitates the adjustment and operation of the different signals, as this adjustment and operation can be effected from the outside. The colored glasses are confined in a case, g^7 , as shown in Fig. 13*, so as to be partially covered and protected from injury.

When no signal is required, the green and red glass signals are both drawn forward, one over the other, behind the white glass, and this makes the white glass opaque, as no light can be seen through the glasses thus adjusted.

If preferred, a tin or iron slide, as $H^2 f^2$, as illustrated in Fig. 7, can be applied to shut off the light when no signal is required, instead of using the red and green glasses for that purpose.

In the modification shown in Figs. 15 and 16 the changeable color-signal glasses g or g' are arranged to slide up and down behind the lenses G or flat glasses in the guides, as in Figs. 3 and 10; but the slots f^6 for their entrance and withdrawal are formed in a projecting frame, c^4 , on the outside of the case, and lips or handles are applied at the top of the glasses g or g' . With this construction the red, green, or other colored glasses are interchangeable, so that any desired color can be used.

The modification Fig. 17 shows a semi-cylindrical skeleton frame, r^6 , to be fastened to each side of the head-light case, and constructed so that the Fresnel or plain glass can be dropped into position in the frame and readily removed, so that another color, if desired, or a metal cover corresponding exactly in form with the glass G , for shutting off the light when no signal is required, can be used.

The different color-signals when not in use can be carried in a box inside the head-light case.

The modification Fig. 18 comprises a series of caps or covers, f^8 , with different-colored glass applied to them. These caps are fitted around collars or ring-frames f^9 , projecting on the outside of the head-light case, one on each side, and when no signal is required a metal cap, G^4 , Fig. 18*, without glass, applied to it, is to be placed upon the projection. These several caps are to be used when required for different purposes—such as showing a red signal or a green one, or to shut off the signal entirely—and they are secured by frictional bind between signal-frame and collar, or by other well-known suitable means.

My invention is not confined specially to any one of the signaling contrivances described and shown, the same only being illustrations of the best constructions known to me for carrying out my invention.

$H H'$ are inclined shields arranged above or in proper relation to the indicator or number or name plates $b b'$ and the signals $G G'$. These shields have a downward inclination from the door C and side C' of the case A , and toward the main reflector D , as shown, their inner edges being near the reflector; and their form and location are such that they shut off the light from the chimney-opening a' of the reflector from the number or name plates $b b'$ in the door C and side C' , while they serve for collecting and throwing the light from the burner-opening a upon the number or name plates $b b'$, thereby greatly intensifying said light and increasing the illumination of the plates and signals.

In Figs. 6 and 6* a collar, H^4 , is shown placed around the chimney-opening a' , for the purpose of partially or wholly excluding the

light from the number or name plates, which would escape at said opening were the collar not provided. By using the shallow collar, as shown, with the shields, as $H H'$, these shields may be made smaller and of more convenient form, and by using a collar of sufficient length for excluding all this light the shields in some cases might be dispensed with, only the collar being used, while in other cases the collar might be dispensed with and the shields of proper size only be used; and in some constructions of head-lights which employ signals without indicator or number or name plates both the shields and collar H^4 might be dispensed with; but it is far more advantageous to use the shields $H H'$ either separately or combined with the collar, as they serve, in addition to their office of excluding the light from the number or name plates, for concentrating or directing the light of the burner upon the signals, and thereby intensifying the effect of the light for illumination of the signals.

In the drawings the shields $H H'$ are shown hinged at d and sustained by hinged stay-hooks d' ; but they may be fastened in any other suitable manner. Door C and side C' would answer the same purpose. The shields $H H'$ are not fastened to the reflector, but are made to rest upon or along the sides of the same, as represented, and when the door C is opened one of said shields moves with it away from the reflector.

I is a curved-surfaced auxiliary reflector, placed behind the main reflector in the reflector-case, occupying a place directly opposite the lower or burner opening, a , of the reflector. This reflector I has a double-curved surface, and in form it resembles two cyma reversas united end to end, as shown, and its forward or reflecting surface is inclined backward from a perpendicular line. The inclined position and double-curved form of the reflector are such in respect to the burner and signals or indicator-plates that the light of the burner falls upon it at a right angle, or nearly so, or at the most proper angle, and is reflected forward and upward, so as to fall directly upon the signals $G G'$ or indicators $b b'$. In other words, the light of the burner shows the image of the flame upon the reflecting-surface at about the two black spots $e e$, thus giving the appearance as if a light or flame was standing directly behind the signal-glasses $G G'$ —that is, when a person is standing in front or on the side of the signal and is looking at the signal-glass he sees the reflection of the light or flame which is shown on the reflector at $e e$.

The auxiliary reflector requires to be of the proper shape to show a flame on it, so as to produce the result stated. Any style of auxiliary reflector will not do it—that is, you cannot in looking through the colored signal-glass see the reflection of the image of the flame shown on the auxiliary reflector unless it is of a proper shape, and placed in proper

position with respect to the burner and signals—that is, made of a double-curved form and inclined, or of other equivalent form and arrangement which will produce the desired effect.

In Fig. 5 the same combination as is shown in Fig. 2 is embraced, excepting that the color-signals are not provided in the door and side C C'. This view illustrates my novel combination of shields, and also of auxiliary reflector, with a main reflector and number or name plates.

In Fig. 6 the same combination as that shown in Figs. 2 and 5 is embraced, excepting that the head-light is not provided with the number or name plates b b'. This view also shows a collar or tube, H⁴, applied around the upper or chimney opening, a', for the purpose of excluding the light above the reflector from the name or number plates.

In the construction shown in Fig. 11 the head-light case has its rear corners flattened or squared, and in these corners colored bull's-eye or other form of glasses G² may be applied; or such glasses may occupy the position shown in dotted lines in the same figure. These glasses thus placed will receive some light from the burner.

I am aware that it is not new, broadly, to provide a main reflector of a head-light with perforations for the emission of light for the purpose of illuminating signals; nor is it new to provide a signal and a number-plate united on the side of a head-light.

In a pending application (Serial No. 128,505) of mine some novel illustrations of the employment of the invention herein claimed are shown. I do not claim in this patent anything which is claimed in said pending application.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a locomotive head-light, the combination of a reflector-case, a signal on the side of said case, a burner, and a main reflector, with a burner-opening in it for the burner, and through which said opening the light passes for the illumination of the said signal, substantially as described.

2. In a locomotive head-light, the combination of a reflector-case, an indicator-plate on the side of said case, a burner, and a main reflector with a burner-opening in it for the burner, and through which said opening the light is supplied for the illumination of the said indicator-plate, substantially as described.

3. In a locomotive head-light, the combination of a reflector-case, a signaling or indicating device on the side of the case, a burner, a main reflector having a burner-opening in it for the burner and for the illumination of the side signaling or indicating device, and an auxiliary reflector which reflects the flame from the burner or the light upon the signal or indicator, substantially as described.

4. The combination, in a head-light, of a

reflector-case, a signal, a main reflector having a burner-opening in it for the burner and for the illumination of the signaling device in rear of the front of the reflector-case, a burner, and an auxiliary reflector which is double-curved, whereby the reflection of the flame can be seen on looking at the signal, substantially as described.

5. The combination, with a locomotive head-light comprising a reflector-case, a burner, a main reflector, and a signaling or indicating device on the side of the reflector-case, of an auxiliary reflector, I, which is constructed and applied to present a double curved and inclined surface to the flame or light supplied from an opening in the main reflector, and which shows the reflection of the flame upon the auxiliary reflector, and reflects the flame and light obliquely upward and forward upon the signal or indicator device, substantially as described.

6. A locomotive head-light comprising a reflector-case, a burner which supplies light for track and signal illumination, a perforated reflector in which the burner is set, and a plurality of color-signals supported on the side of the case, which signals can be adjusted on their supports, so as to be made to coincide or not coincide with one another, and means for controlling the light, substantially as described.

7. In a head-light provided on its side with a color-signal having a removable cover, a main burner and a main reflector perforated for the passage of the signal-illuminating light, and an auxiliary reflector double curved, as described, whereby when the cover is removed the reflection of the flame can be seen on looking at the signal, substantially as described.

8. A locomotive head-light comprising a reflector-case, a series of interchangeable signals for use on the side of said case, a burner, and a main reflector having an opening in it for the burner and for passage of light for illumination of the side signals, substantially as described.

9. A locomotive head-light comprising, in combination, a reflector-case, a transparent indicating device applied on the side of the case, a perforated main reflector, a burner, and a shield which both excludes the light at the chimney-opening in the main reflector from the indicating device, and concentrates the light passing up from the opening in the reflector upon the said device, substantially as described.

10. The combination of the shield H⁴ and the shield and light concentrator H', with the reflector-case, transparent indicating device on the side of the said case, a perforated main reflector, and a burner, substantially as described.

11. A head-light provided with a series of color-signals on its sides, which can be moved on supports past one another from the outside of the reflector-case, and which signals are

illuminated by light supplied through a perforated reflector from a burner which supplies light for track-illumination, substantially as described.

- 5 12. A locomotive head-light comprising, in combination, a reflector-case having color-signals in its rear end, a reflector perforated for

the emission of light for the illumination of the signals, and a burner, substantially as described.

IRVIN A. WILLIAMS.

Witnesses:

CHARLES I. WILLIAMS,
JAMES E. HALL.