

(Model.)

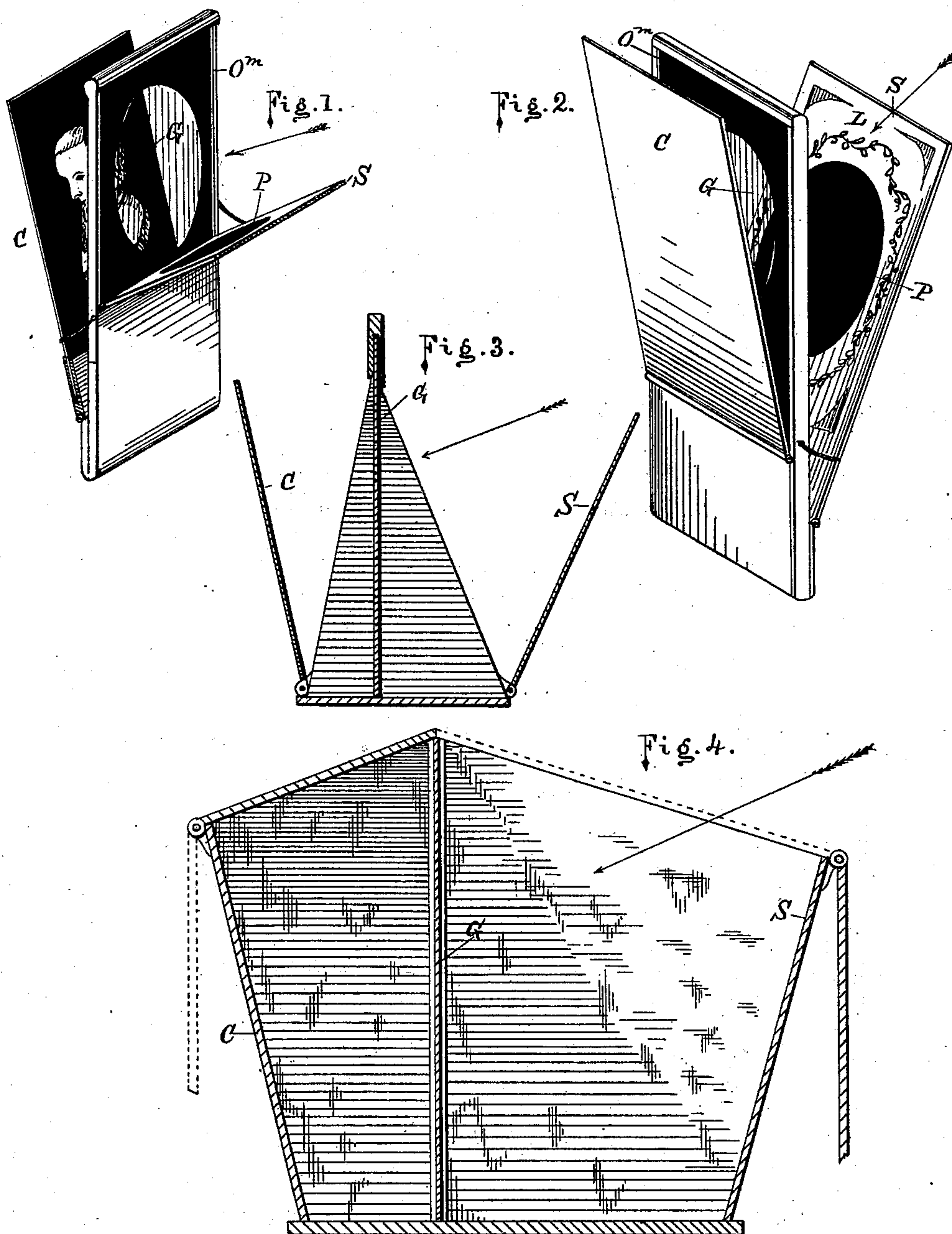
4 Sheets—Sheet 1.

F. E. MILLS.

METHOD OF AND DEVICE FOR EXHIBITING PICTURES.

No. 256,353.

Patented Apr. 11, 1882.



WITNESSES:

Thos. Houghton.
A. G. Lyne.

INVENTOR:

F. E. Mills
BY *Wm. L.*

ATTORNEYS.

(Model.)

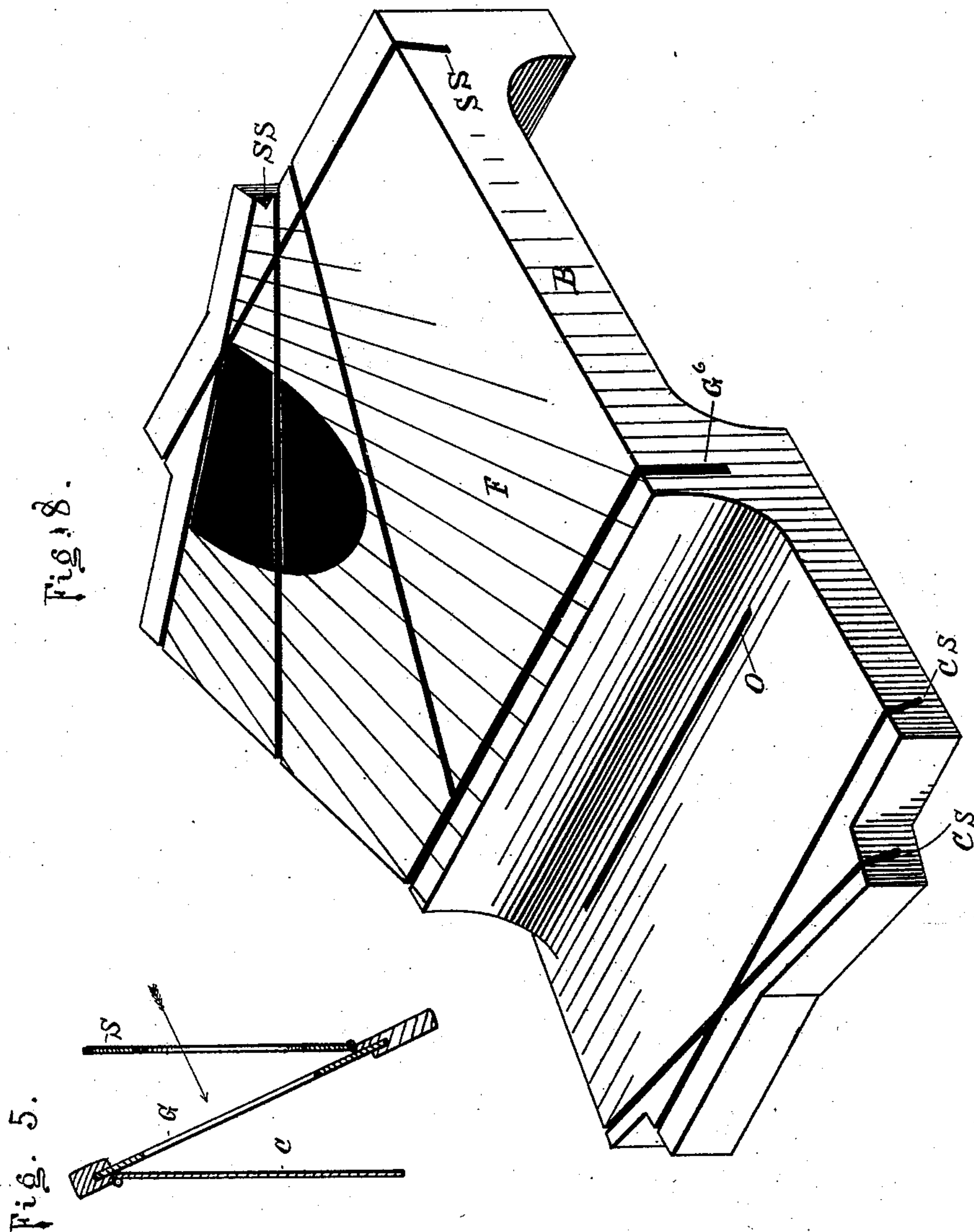
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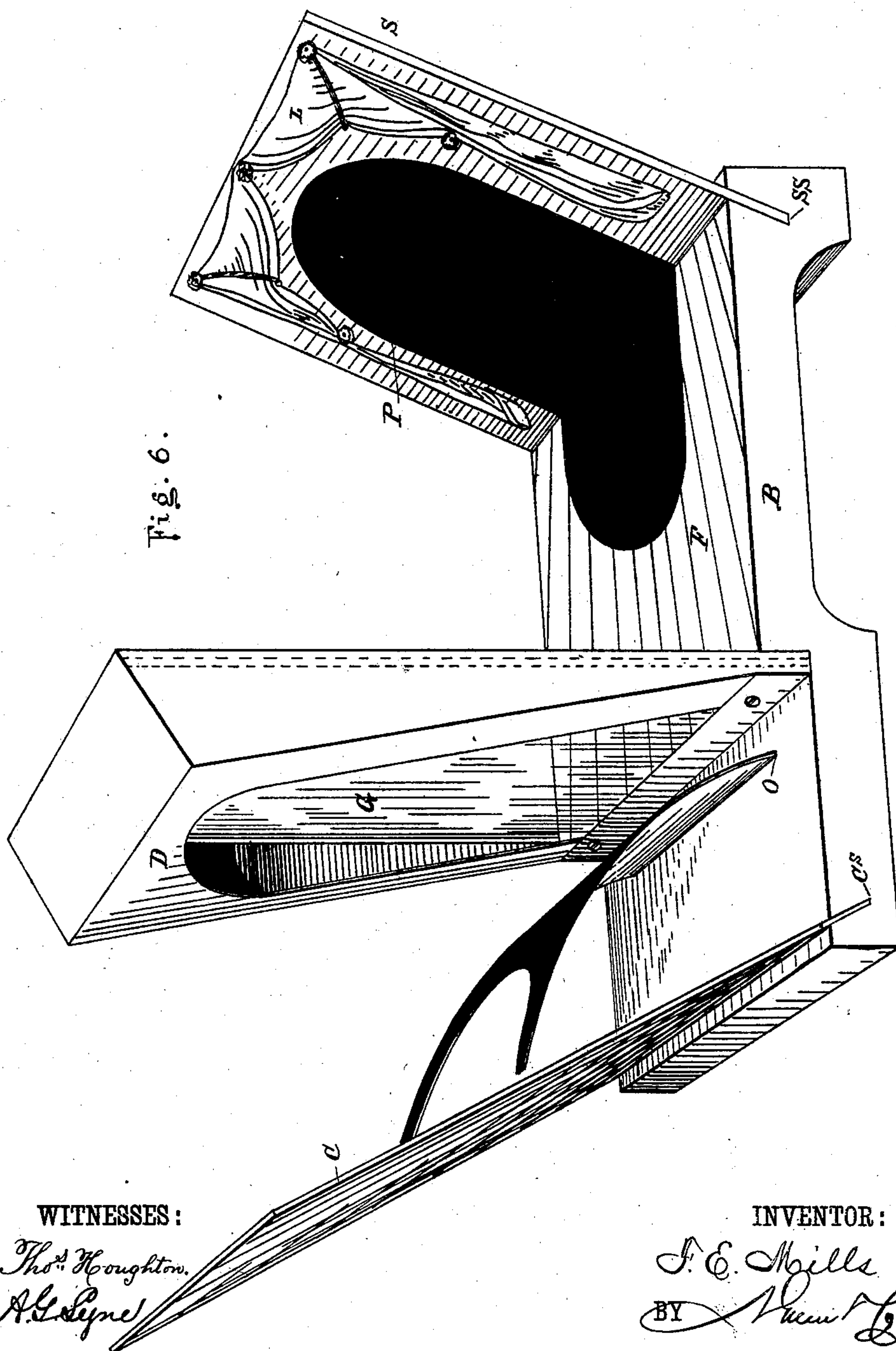
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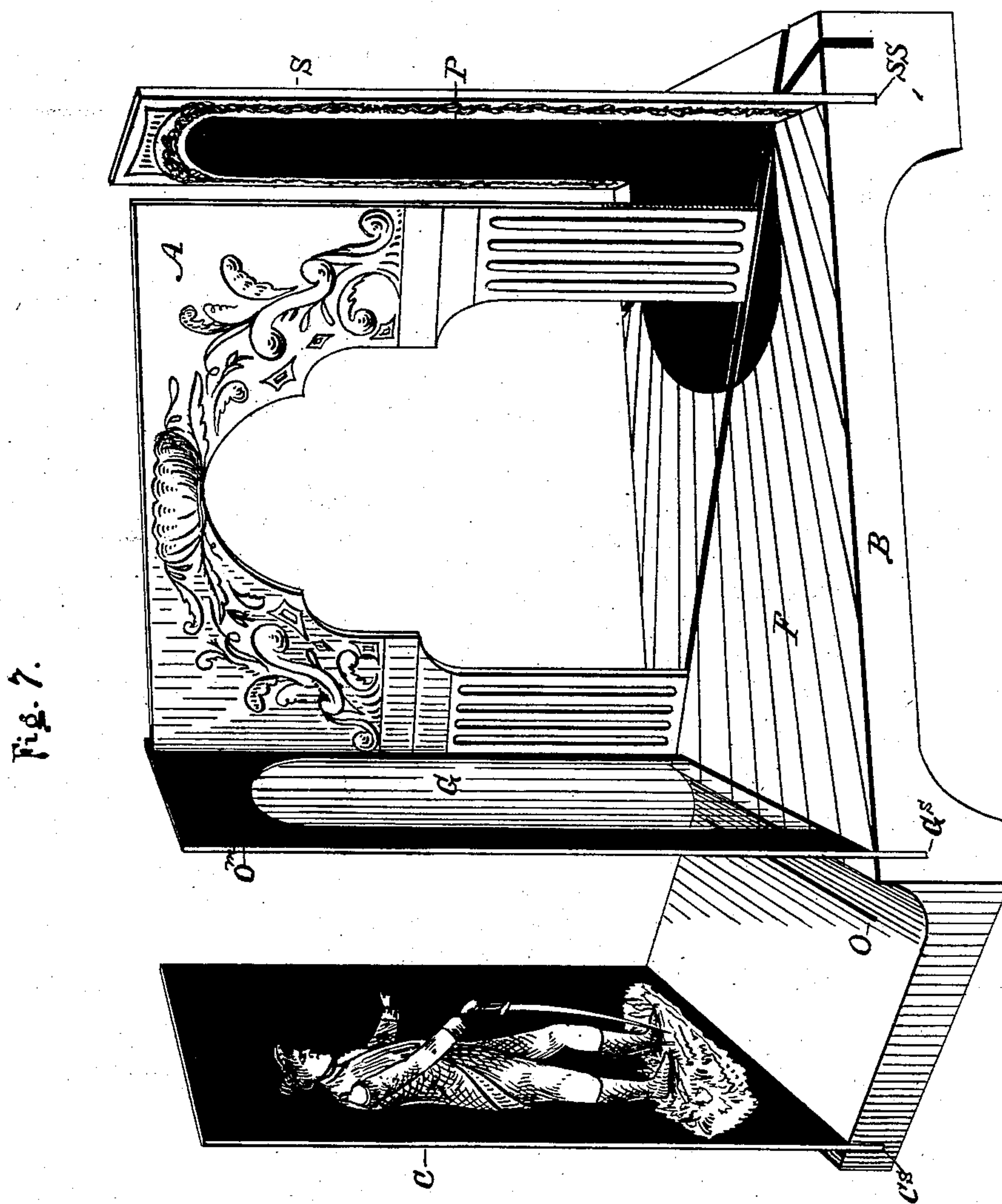
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ATTORNEYS.

UNITED STATES PATENT OFFICE.

FRANCIS E. MILLS, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR OF ONE-HALF
TO WILLIAM McMAHON, OF SAME PLACE.

METHOD OF AND DEVICE FOR EXHIBITING PICTURES.

SPECIFICATION forming part of Letters Patent No. 256,353, dated April 11, 1882.

Application filed January 19, 1882. (Model.)

To all whom it may concern:

Be it known that I, FRANCIS E. MILLS, of
Pittsburg, Allegheny county, Pennsylvania,
have invented a novel Mode of Setting and Ex-
hibiting Photographic Portraits and other
small Pictures, of which the following is a full
and exact description, reference being had to
the accompanying drawings, in which—

C represents the blackened card containing
the picture; G, the glass; O^m, the opaque mar-
gin of the glass; S, the screen; P, the penum-
bra or blackened center of the screen; L, the
luminous border or figures surrounding the pe-
numbra on the face of the screen; D, the opaque
diaphragm used in certain cases to produce
the opaque margin on the glass. The arrows
indicate the line of sight when viewing the
picture. C^s, the slot for holding the card in a
block; G^s, the slot for holding the glass in a
block; S S, the slot for holding the screen in
a block; O, the slot for holding a blackened
counter-screen in a block; B, a horizontal
block for holding all the parts in position; F,
the perspective floor or ground delineated on
the block; A, the figure of an arch, to be used
when the card is inclined laterally from the
glass.

Similar letters indicate the same parts in
each figure.

I call the invention a "phantoscope." It
consists in placing the portrait on a black
ground or card behind, but at some little dis-
tance away from, a polished plane glass having
a transparent center and opaque margins, and
placing still farther away from but in front of
this glass an opaque screen having a black-
ened center and luminous borders, (or lumi-
nous figures between the borders of the screen
and the glass,) the card, the glass, and the
screen being placed at such distances from and
at such angles with each other, respectively,
that when the light falls obliquely upon the
picture and it is viewed from a point at right
angles with its plane the paper or card on
which it is taken will be invisible, leaving the
portrait standing apparently statue-like in the
air, while images or phantoms of the luminous
figures upon the screen will, by reflection from
the glass, appear projected beyond and around
the portrait, producing a magical, pleasing,
and life-like effect. The apparatus employed

to produce this effect consists mainly of the
three parts above mentioned—viz., the black-
ened card, the glass, and the screen—together
with any suitable device for holding these
parts in their respective positions.

The face of the card C containing the picture
to be viewed must be entirely black (except
the picture itself) and have a smooth and even
surface. It should be large enough to leave a
wide black margin of from one inch to one
and a half inch in every direction outside the
picture. The object of blackening the face of
the card is twofold: first, to render it invisible
to the eye when the light falls upon it obliquely
and its edges are concealed from view; second,
to render the glass in front of it strongly
reflecting by excluding from the eye all trans-
mitted light from behind, except what flows
from the picture itself. This black ground of
the card should be produced by the photogra-
pher in taking the likeness by placing behind
the sitter a black woolen cloth absorbent of
light; but in cases when this has not been
done the card may, by using care, be black-
ened with india-ink.

As the glass G is to transmit as well as to
reflect images to the eye, it should be quite
true, plane, and transparent, a little wider and
from one to two inches higher than the picture-
card. The margins O^m of the glass, for an
inch or more in width all around, are rendered
opaque for the purpose of concealing from the
eye the edges of the card when the picture is
being viewed through the glass. I usually pro-
duce this opacity by painting the back of the
glass for the requisite width with some black
pigment; but sometimes, when the picture is
large and full length and set at considerable
distance from the glass, I place a blackened dia-
phragm of pasteboard or metal behind the
marginal portions of the glass, between it and
the edges of the card, as seen at D, Fig. 6; or,
if desirable, the opaque margin of sufficient
width may be secured by inclosing the edges
of the glass in a very wide frame. In the lat-
ter case, however, the front portion of the
frame should be cut away, so that it may not
encroach too much upon the reflecting-surface
of the glass.

The screen S is made of a thin piece of metal,
wood, or pasteboard. It should be somewhat

larger than the picture-card, and is placed in front or obliquely in front of the glass G, usually about twice the distance from the glass that the picture is; but its exact position may
 5 be considerably varied to suit different kinds of pictures, and would sometimes be governed by the angle at which the picture stands with the glass. One principal function of the screen
 10 is to cut off from the glass all light (from the dress, face, or other luminous objects in the room outside of itself) that would be incident to the glass at such an angle that it would be reflected back to the eye when viewing the picture. Another use of the screen is to hold
 15 the luminous figures whose images are to be reflected beyond and around the portrait; but all the central portion of the screen, the light from which would otherwise be reflected to the eye in line with the portrait itself, must be
 20 made entirely black and absorbent of light, so that no reflected rays shall interfere with the light transmitted to the eye by the picture. This blackened central portion, P, of the screen I call the "penumbra." In some forms of the
 25 apparatus I make this penumbra by cutting out the central part of the screen, leaving simply a dark aperture. Around the borders of the penumbra, either on the face of the screen itself or between its marginal portions and the glass,
 30 are placed luminous figures L, or drawings representing physical objects, such as an arch, architectural columns, trees, buildings, wreaths of flowers, curtains, or any other objects suitable to form the background or surroundings
 35 of a portrait. (What I mean by "luminous figures" in the foregoing sentence is figures drawn in bright colors and highly reflectent of light.) In some cases, when it is desirable to change the scenery often, I place these lumi-
 40 nous figures on separate slips of paper or paste-board temporarily attached to the screen and easily replaced by others; and for large and full-length portraits, where the image is to be thrown over it, (like an arch,) I sometimes place
 45 such figure on a separate support considerably nearer the glass than the screen is, as seen at A in Fig. 7; but in most cases the luminous figures would be placed immediately on the face of the screen.
 50 The specific distances at which the card, the glass, and the screen should be placed from each other, and the angles of inclination requisite to produce the best effects, as well as the devices which may be employed for holding
 55 the parts in position, are largely matters of choice, dependent, too, somewhat upon the character of the picture, (whether simply a bust, a three-quarter, or a full-length portrait,) and are susceptible of so many variations, even for
 60 each kind of picture, without departing from the principle of the invention, that I will give only such general directions for the arrangement and use of the parts as will be applicable to all and enable any person familiar with
 65 the laws of catoptrics to construct the apparatus and use the process in any form, on any

class of pictures, or on any scale he may desire.

The picture, in order to present its true proportions, should always be viewed from a point
 70 at right angles with the plane of the card. While the picture is being viewed it is to be placed in such a position with reference to the light (a window or gas-jet or lamp) that the
 75 latter shall fall upon it obliquely, or from a direction nearly in line with the plane of the glass, so that no light can be reflected to the eye by the polished surface of the card.

The object and functions of the screen being understood, it will be obvious that if the pic-
 80 ture-card and the glass were set on parallel planes the line of sight, in order to be at right angles with the plane of the card, would be at right angles with the plane of the glass also, and the light from the face of the person view-
 85 ing, being incident to the glass at a right angle, would be reflected back at the same angle into the eyes and destroy the effect by interfering with the light transmitted from the picture. The screen in that case could not be
 90 effectively used without cutting off the proper view of the picture, unless the central or penumbra portion were cut away. Even then the light from the upper part of the face of the viewer
 95 would be thrown back through the aperture into the eyes, unless the face were darkly shaded. For these reasons I should seldom place the card and glass parallel to each other. It may be done, if desired, but necessitates the incon-
 100 venience of darkening the face of the viewer in order to produce the necessary penumbra in line with the picture. This difficulty is obviated by placing the picture-card at such
 105 an angle with the glass that the line of sight while at right angles with the picture may pass so obliquely through the glass that all
 110 light from the face of the person shall be incident to the glass at an angle that will reflect it away from the eyes. Then the screen, with its penumbra, can fully perform its office with-
 115 out intercepting the proper view of the picture. There are various degrees of inclination from the glass at which the card may be set, and also different directions of inclination. It may be inclined from the glass vertically,
 120 as shown in Figs. 1, 2, 3, 4, 5, and 6 in the accompanying drawings. It may be inclined laterally, as shown in Fig. 7, or it may have both a vertical and lateral inclination at the same
 125 time, as shown by the slots C^s in Fig. 8, and still produce pleasing effects, yet the effects would be different in each case. When the inclination is vertical the line of sight would necessarily be over the top of the screen. When
 130 lateral it would pass by the side of the screen. For full-length portraits I usually, in addition to the upright figures on the face of the screen, make a perspective representation of a horizontal floor or ground, F, extending from the screen to the glass, which by reflection will
 appear under the feet of the portrait, as shown in Figs. 6, 7, and 8 in accompanying drawings.

In that case the penumbra should be continued below the screen proper and extend for a little distance along the central portion of the floor.

5 The other optical principles involved in the invention may be briefly stated thus: The blackened portion of the face of the card, possessing no element of light in itself, cannot be revealed to the eye by illumination and radiation, and when held at those angles with the light and eye heretofore indicated there cannot be any direct reflection to reveal its material surface. Hence, if entirely smooth and black, it would be necessarily and absolutely invisible; but the edges of the card presenting a very different angle to the light than its face would, even if blackened, still be visible by direct reflection, and these edges, having the same binocular parallax as the picture, would leave the mental inference of one continuous flat plane connecting these edges and the picture, and the viewer would imagine he saw a black card so long as such edges were in sight. Hence the necessity of the opaque margin to conceal them. It is for nearly the same reason that I place the card away from the glass, for if placed against the glass the two eyes would form the same parallax on the glass, the margins of the glass, and the picture itself, and suggest to the mind a flat picture taken or pasted on the flat plane of the glass. I therefore place it away from the glass and have no visible object or image in the line of view which could present to the eye the same angle of parallax as the picture itself, except such images as cross the plane of the card. These conditions being all complied with, the picture, although not stereoscopic in fact, will, if properly developed, present to the two eyes the same kind and degree of solidity that the real person would when viewed with one eye, greatly enhanced to the mind by the different parallax of the image seen in proximity with and nearly in line beyond it.

45 In the accompanying drawings I have indicated some of the forms of apparatus and modes of using the principle of the invention which I deem the most convenient and desirable, in which—

50 Figure 1 represents a folding form of apparatus suitable for exhibiting small vignette portraits or busts, the card, and also the screen, being hinged to a slight frame of wood, pasteboard, or metal which holds the glass. The card may have an inclination of fifteen or twenty degrees and the screen seventy or seventy-five degrees from the plane of the glass. The luminous border surrounding the penumbra of the screen may represent a wreath, as in Fig. 2, which, when inclined at this angle, will appear to surround the portrait. Fig. 2, also folding, and suitable for either a vignette or three-quarter portrait, is nearly of same form as Fig. 1, except that the screen is hinged lower down on the frame, and in opening to the same angle as the card will be nearly twice

as distant from the glass, and throw the image entirely beyond the portrait and nearly parallel with it. Fig. 3 is in the form of a box or case, convenient for standing on a table. The lids or flaps close up when not in use, protecting the picture and glass from dust. The right-hand lid constitutes the screen, on the face of which are the penumbra and luminous figures, and to the left-hand lid is attached the card containing the portrait. When opened at these angles (represented in the drawings) the image on the screen (say columns wreathed with vines) would appear standing beyond and on a plane nearly parallel with the portrait. Fig. 4 is also in the form of a closed case or box to stand upon the table. One end of the box, from which the light is to enter, is made of glass, and when not in use the hinged top is closed. This in form and size is well adapted for small full-length portraits. The card may be set against the inclined back C, the entire face of the front side, S, may be blackened, and the luminous figures drawn upon separate sheets of pasteboard (with the central portion large enough to form the penumbra cut away) can be set against the blackened face and be replaced by others at pleasure. Fig. 5 represents a mode of arranging the card, glass, and screen, in which the penumbra is made by cutting out the central portion of the screen, the line of sight passing through the aperture thus formed. In this form the card and screen are placed on parallel planes and open from opposite edges of the glass, and also at opposite and equal angles with it. The image upon the screen would, in this arrangement of the parts, be projected obliquely across the plane of the card. The parts may be hinged to a light frame holding the glass, and fall together when not in use, as represented in the drawing, (in which form it would be most suitable for small vignette portraits;) or the same relative position and angles may be employed in a large apparatus for full-length portraits, if desired.

In Fig. 6 the apparatus is in the form of a horizontal block of wood having narrow slots sawed in its upper surface transversely with the grain, to receive and hold the respective parts when in use, the slots being cut at such angles and distances apart as would be best adapted to the kind of picture to be viewed. The parts can be removed from the block and packed in a box when not in use. This is the most convenient form in which to use the perspective floor heretofore mentioned. It is represented at F. When used for full-length portraits the penumbra should extend entirely to the bottom of the screen and for some little distance along the floor. Other figures not encroaching upon the penumbra may be placed on this floor between the screen and the glass with pleasing effect. In all the foregoing the card is represented inclining vertically from the glass; but in Fig. 7 (also a horizontal block) the card inclines laterally from the glass, and the line of view passes along the side in-

stead of over the top of the screen. The drawings represent it arranged for a full-length portrait, and it is furnished with a perspective floor, the penumbra extending down to and covering a portion of such floor. In addition to the luminous figures upon the screen, (which in the position shown in Fig. 7 would be projected entirely beyond the plane of the portrait,) I commonly, in using this form and mode of inclination, place between the screen and the glass, at right angles with the plane of the card, the figure of an arch supported by columns, as shown at A, which by reflection would be projected obliquely across the plane of the card, and the portrait would appear standing under the arch. I give the card this lateral inclination also in a folding or closing form of the apparatus for three-fourths-length portraits, the card being drawn upon the screen itself and hinged to the frame or box that holds the glass, so that it may open out to a proper angle with the card when the picture is being viewed and be closed up against the glass (like a door) when not in use, (similar to Fig. 1 or Fig. 2 turned down on its side.) When a perspective floor is used all that portion of the apparatus between the glass and the card should be either covered with black cloth absorbent of light or dropped down an inch or more below the level of such floor, in order that no transmitted light shall interfere with the reflected images of the floor.

Fig. 8 represents a form of block in which the position and angles of both the card and the screen may be changed at pleasure in order to produce a variety of effects with a single apparatus. The glass being stationary in the slot G^a, the card and screen may, by using the appropriate slots with which the block is provided, be set with either a lateral or a vertical inclination from it, or both, as may be desired. The perspective floor for one mode of inclination—say the lateral—can be drawn upon the block itself, as seen at F, and another perspective floor or ground be made on a separate sheet of pasteboard, to be laid on the block in the proper position when the card is inclined vertically.

In the larger forms of the apparatus I also provide just behind the glass a slot or other suitable device (marked O) for holding a black counter-screen, as in Fig. 6, such counter-screen to be employed, when desired, for the purpose of cutting off from the line of view the lower portion (or any other particular portion) of the portrait, and substituting in the place of the part cut off the reflected image of some other object or figure placed at the proper position on the floor of the apparatus. By using such a counter-screen a great variety of amusing effects may be produced with the apparatus in addition to the general effect heretofore mentioned. For example, suppose the black counter-screen to be so shaped and placed in its slot as to cut off the lower half of the por-

trait from view, and a small goblet or vase (or a paper representation of a goblet or vase) were placed on the floor between the glass and the main screen at such a point that its reflected image would coincide with the position of that part of the portrait concealed from view, on looking at the picture from the usual direction the black counter-screen would itself be invisible and the person would appear to be standing in the goblet or vase. By exercising a little skill and care in conforming the outlines of the counter-screen to the shape of the object or figure proposed to be used, entire transformations of the dress, the hat, the form, and even the face of the portrait may thus be produced, or other combinations made with it of an amusing character.

I do not confine the invention to stationary pictures, but employ it also in any rotating apparatus where, the glass and screen being stationary, the pictures (all taken on black cards) may by rotation be brought successively into the proper position behind the glass.

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

1. The method of setting, arranging, or exhibiting pictures, which consists essentially in placing the picture on a black ground behind, but away from, a glass having a transparent center and opaque margins, and placing still farther away from, but in front or obliquely in front of, this glass a screen having a blackened or cut-away center with luminous borders, or luminous figures between the borders of the screen and the glass, the picture, the glass, and the screen being arranged at such distances from and at such angles with each other, respectively, that when the light falls obliquely upon the picture and it is viewed from a direction at right angles with its plane the paper or card on which the picture is taken will become invisible, while images of the luminous objects upon the screen will be seen by reflection projected beyond or around the picture, substantially as herein shown and described.

2. A frame, box, or supporting-block for exhibiting pictures, containing a device or devices for holding a transparent glass with opaque margins or diaphragm between a picture on a black ground and a screen having a blackened or cut-away center, substantially as and for the purpose set forth.

3. A frame, box, or supporting-block for exhibiting pictures, containing a device or devices for holding a card-picture, a glass, and a screen in substantially the relative positions described, whereby, to a person looking through the glass by the aid of a light falling obliquely upon the picture, the black card will be apparently invisible and an image of the screen will be projected beyond or around the picture, as specified.

4. In combination with a device or devices for holding the card, glass, and screen in the

relative positions herein described, a floor or ground, F, represented in reverse perspective, substantially as shown and described.

5 5. In combination with devices for holding the card and the glass in the relative positions described, the arch A, held in a stationary device, or hinged, substantially as and for the purpose herein set forth.

10 6. The block B, provided with means for holding the card, the glass, the screen, and the arch in their relative positions, substantially as and for the purpose described.

7. The block B, having means for holding the card, glass, and screen, and the slot O for

holding a blackened counter-screen behind the 15 glass, substantially as and for the purpose described.

8. A frame, box, or case for holding pictures, containing a screen with a blackened or cut-away center, a glass with an opaque mar- 20 gin or diaphragm, and a device for holding a picture behind the glass, substantially as and for the purpose set forth.

FRANCIS E. MILLS.

Witnesses:

SOLON C. KEMON,
JOHN T. LAWRENCE.