E. R. STEALY.

APPARATUS FOR THE EXAMINATION OF X-RAY AND OTHER NEGATIVES.

APPLICATION FILED SEPT. 18, 1918.

1,350,042.

Patented Aug. 17, 1920.

3 SHEETS—SHEET 1.

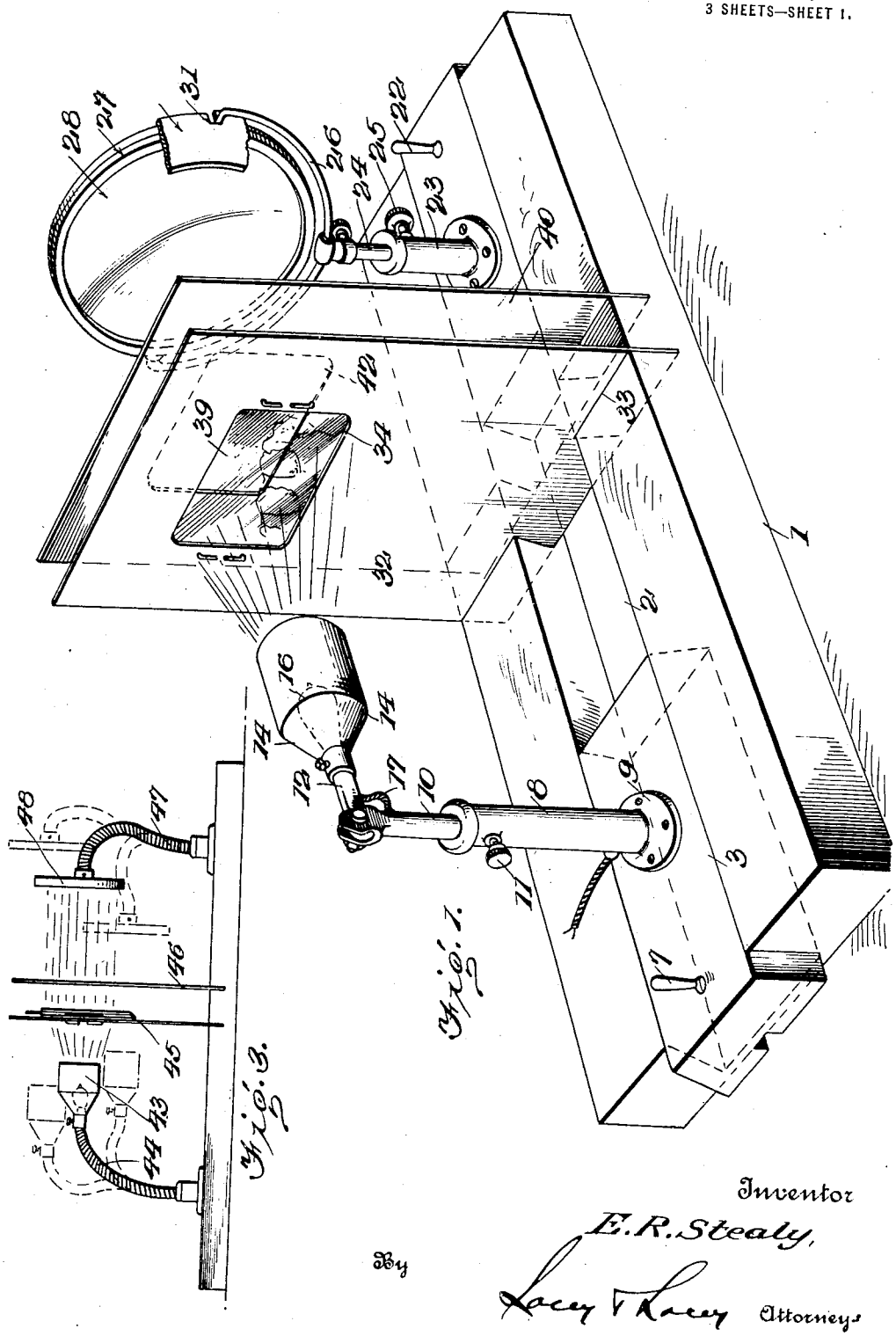


Fig. 1.

Fig. 3.

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3 SHEETS—SHEET 2.

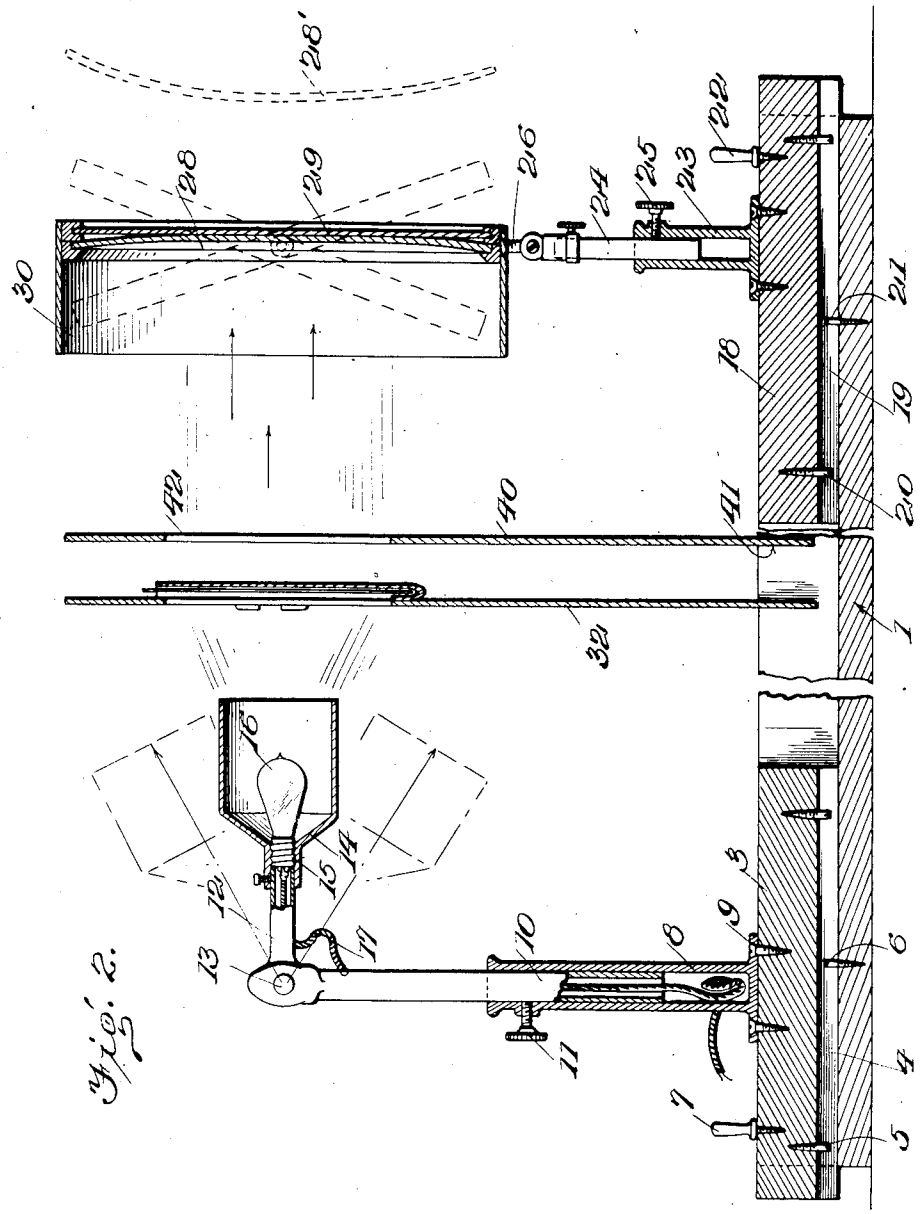


Fig. 2.

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3 SHEETS—SHEET 3.

Fig. 7.

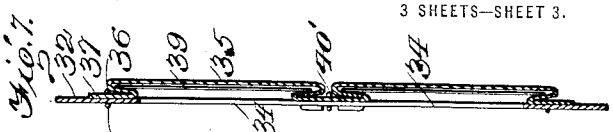


Fig. 6.

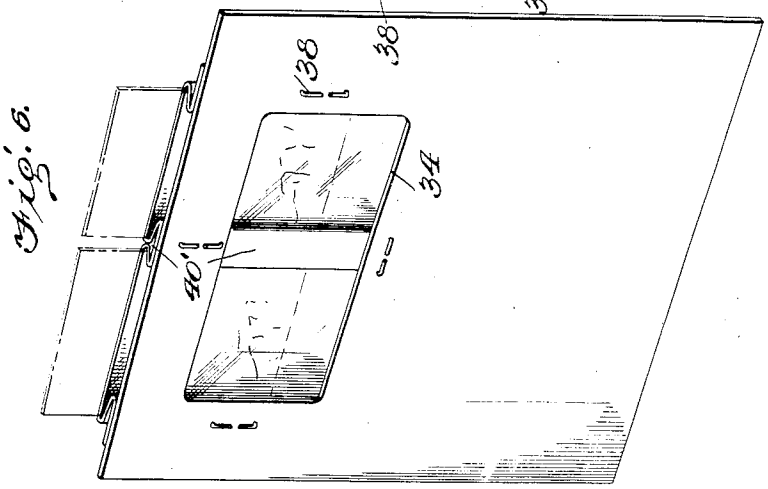


Fig. 5.

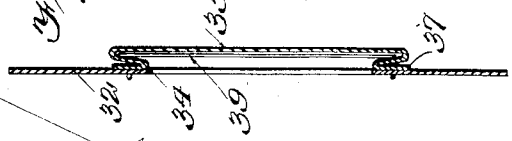


Fig. 4.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR THE EXAMINATION OF X-RAY AND OTHER NEGATIVES.

1,350,042. Specification of Letters Patent. Patented Aug. 17, 1920.

Application filed September 18, 1918. Serial No. 254,606.

To all whom it may concern:

Be it known that I, ELZA R. STEALY, a citizen of the United States, residing at Shenandoah, in the county of Page and State of Iowa, have invented certain new and useful Improvements in Apparatus for the Examination of X-Ray and other Negatives, of which the following is a specification.

This invention has as its object the provision of a novel apparatus for use in the examination of X-ray and other negatives.

Heretofore it has been customary after the production of an X-ray negative, to make a print thereof and then examine the print. However, more or less of the details of the negative are lost in the printing process so that this method is usually unsatisfactory. To overcome this disadvantage it has by some been the practice to examine the negative direct either with natural or artificial light, but even by this method it has been impractical to observe all of the minute details of the negative. There is also the stereoscopic method of studying negatives although this method is not always practical as two negatives are required. The present invention, therefore, has as its primary object to provide an apparatus by the use of which every detail in a negative of this or any other type may be observed and studied with the result that a more complete diagnosis is possible than by the previously referred to methods of examination.

A further object of the invention is to provide an apparatus by the use of which separate portions of a negative may be examined for details and any desired portion may be brought out in the greatest detail for examination.

The invention also has as its object the provision in an apparatus for the purpose stated of means whereby the negative as a whole or any portion thereof may be illuminated with any desired intensity of light without the employment of rheostats or other dimming devices, and the whole or any portion of the negative may be viewed on a more or less enlarged scale. If, during the examination of such a negative, the same is illuminated with the same intensity of light, there is much detail lost as some of the shadows will be washed out if the light is too intense or the denser shadows will not be brought out in great detail if the light is subdued, and it is for this reason that the apparatus is adjustable so as to permit of illumination of the negative as a whole or any portion thereof to any desired intensity, and the examination of the entire negative or any portion thereof on its normal scale or on any suitable scale of enlargement. By the enlargement of the negative, a stereoscopic effect is produced to some extent which is better seen by comparison between the normal scale and the magnified or enlarged scale.

The invention further has as its object the provision in apparatus for the purpose stated, of a novel negative holder embodying means for diffusing the light rays so that when the negative as a whole is being examined all portions thereof will be illuminated with the same degree of intensity.

In the accompanying drawings:

Figure 1 is a perspective view of one type of apparatus embodying the present invention;

Fig. 2 is a vertical front to rear section therethrough;

Fig. 3 is a side elevation illustrating another type of apparatus;

Fig. 4 is a perspective view illustrating the parts of the holder for a single negative disassembled;

Fig. 5 is a view looking at the upper edge of the holder shown in Fig. 4;

Fig. 6 is a perspective view of a holder for two negatives;

Fig. 7 is a view similar to Fig. 5 illustrating the holder shown in Fig. 6.

Briefly stated, the apparatus embodying the invention includes a source of light supply, a mirror preferably of the plano-concave type, a negative support arranged between the source of light and the mirror, and a light screen arranged between the negative support and the mirror, the source of light and the mirror being adjustable for purposes which will be presently pointed out. While the apparatus illustrated in the drawings and to be hereinafter described is particularly suitable for use in carrying out the invention, it will be understood that the drawings are to be taken only as illustrative of one of many arrangements of parts to produce an apparatus for the purpose of examining a negative and I therefore do not limit myself to the precise details and combinations shown and described therein, but reserve the right to include in my invention all modifications which embody the spirit thereof.

In that form of the invention shown in Figs. 1 and 2 of the drawings, the numeral 1 indicates in general a base which may be of wood or any other suitable material and which in the construction illustrated is formed in its upper face with a groove 2 which extends longitudinally medially of the base and has its side walls oppositely inclined so that the groove is of dove-tail form.

The numeral 3 indicates a base block which is of dove-tail form in cross-section and which is slidably fitted in one end of the groove 2, this block being provided in its under side with a groove 4 and having fitted therein spaced studs 5 located near its ends and projecting into the said groove 4 and lying at opposite sides of a similar stud 6 secured in the base 1 and projecting upwardly into the groove 2, the studs 5 and 6 constituting means for limiting the sliding adjustment of the block 3 with relation to the base 1. The block 3 is provided at its outer end with a finger piece 7 by means of which it may be adjusted longitudinally with relation to the base A tubular standard 8 is provided at its lower end with an attaching base 9 which is secured in any suitable manner to the upper side of the block 3, and telescopically fitted within this standard is a second tubular standard 10 which may be raised and lowered and which is designed to be held in its positions of adjustment by means of a set screw 11 threaded through the standard 8 and bearing against the said standard 10. An arm 12 is pivoted as at 13 to the upper end of the standard 10 and may be swung vertically as will be evident by reference to Fig. 2 of the drawings. This arm at its outer end supports a reflector 14 having an electric lamp socket 15 into which is fitted the base of a lamp 16, current being supplied to the lamp by conductor wires 17 led through the arm 12, through the standard 10, and through one side of the standard 8. At this point it may be stated that not only may the standard 10 be adjusted vertically within the standard 8 by loosening the set screw 11, but may also be rotated within the standard 8 so as to angularly adjust the light in a horizontal plane. Thus a universally adjustable support is provided for the source of light. It will be understood, of course, that the source of light may be supported for universal adjustment by means of any of the ordinary ball and socket arrangements.

A base block 18 corresponding to the block 3 is slidably fitted into the other end of the groove 2 and is provided in its under side with a groove 19 into which project studs 20 corresponding to the studs 5 and lying at opposite sides of a stud 21 secured in the base 1 and projecting upwardly into the groove 2, the studs 20 and 21 serving the same purpose as the studs 5 and 6, respectively. Also the block 18 is provided at its outer end with a finger piece 22 whereby it may be slid in the groove 2. Fixed to the upper side of the block 18 is a tubular standard 23, and telescopically fitted into this standard is a post 24 which may be adjusted vertically in the standard 23, and also rotatably as in the instance of the standard 10, the post being held at adjustment by means of a set screw 25 corresponding to the set screw 11. At its upper end the post 24 supports a yoke 26 between the arms of which there is mounted a mirror indicated in general by the numeral 27. This mirror is of circular form and of the plano-concave type. That is to say, the mirror embodies a concave glass 28 at one side and a plane glass 29 at its opposite side, the glasses being, of course, arranged back to back, as shown in Fig. 2 of the drawings. The arms of the yoke 26 support the mirror at diametrically opposite points and, therefore, the mirror may be tilted as will be clear by reference to Fig. 2 of the drawings or it may be completely reversed so that either its concave side 28 or its plane side 29 may be presented toward the source of light. For a purpose which will be presently explained, it is preferable, although not absolutely necessary, that a hood be provided for the mirror, and this hood is indicated in general by the numeral 30 and comprises a cylindrical relatively shallow body formed at diametrically opposite points in one end with bayonet slots 31 whereby the mirror may be engaged with the inturned mirror supporting ends of the arms of the yoke 26 as shown in Fig. 1 of the drawings, the hood being in this manner separately connected with the mirror and yoke and being therefore adapted for disposal at either side of the mirror. Where a large negative is to be examined in its entirety, it is desirable to employ a reducing mirror 28′, as shown in dotted lines in Fig. 2 of the drawings, as a substitute for the mirror 28.

The film or negative holder comprises a plate 32 preferably of opaque material and seated at its lower end or edge in a transverse slot 33 formed in the base 1, the plate being located between the source of light and the mirror. The said plate is formed with an opening 34 preferably of rectangular form and of dimensions approximating those of the negative to be examined. In conjunction with the plate 32 there is provided a pocket to receive the negative to be examined and this pocket, in that form shown in Fig. 4 of the drawings, is designed to contain a single negative and is formed from a suitable blank of transparent or

translucent material such for example as celluloid. The pocket comprises a front 35, the lateral edge portions of which are folded inwardly as at 36 and thence outwardly as at 37, the portions 37 constituting attaching flanges which are secured to the plate 32 at opposite sides of the opening 34 by stitching or by the employment of staples or other fastening means as indicated by the numeral 38. The inwardly folded marginal portions 36 of the front 35 are provided in conjunction with the said front pockets to receive the lateral edge portions of the negative which is indicated by the numeral 39. As these pockets are unobstructed throughout their entire lengths, the margins of the negative to be held may slide freely in the pockets in introducing and removing the negative and as a consequence there is no likelihood of injury to the negative, nor will any difficulty or annoyance be experienced in inserting or removing the same. In order to limit the downward movement of the negative so as to support the same directly opposite the opening 34, the lower marginal portion of the front 35 is folded rearwardly and thence upwardly behind the flanges 37 as indicated by the numeral 40^a so as to provide a bottom for the negative pocket as a whole.

That form of holder shown in Figs. 6 and 7 of the drawings is constructed on the same general plan as the holders shown in Figs. 4 and 5, except that it is designed for the support of two negatives and consequently is approximately twice the width of the holder shown in Fig. 4 as regards the dimensions of the opening 34 and the pocket which includes the front 35 and the negative margin receiving pockets or channels 36. In this latter form of the invention the intermediate portion of the front 35 is folded back and forth upon itself as shown in Figs. 6 and 7 of the drawings and as indicated by the numeral 40′, so that intermediate channels are provided as well as marginal channels corresponding to the channels 36, the intermediate channels or pockets receiving, of course, the adjacent lateral edges of the two negatives to be held.

The screen heretofore referred to is indicated by the numeral 40 and comprises a plate of opaque material seated at its lower end or edge in a transverse slot formed in the base 41 and provided with an opening 42 located opposite the opening 34 in the plate 32. This screen 40 is located between the negative holder 32 and the mirror 27.

In the use of this form of the apparatus, the parts being in the positions shown in Figs. 1 and 2 of the drawings, the concave or the plane side of the mirror is presented toward the source of light and the negative and the light rays will then pass from the source of light through the negative, the front 35 of the negative pocket, and the opening 42 in the screen 40 to the face of the mirror. If the concave face is presented in the direction stated, the image will, of course, be presented on an enlarged scale, but if the plane face of the mirror is presented in the direction stated, the negative will be reflected in its normal scale. If the mirror 28′ is employed, the image will be reduced. The hood 30, of course, excludes extraneous light rays from the face of the mirror and thereby heightens the distinctness with which the image of the negative is reflected in the mirror. Of course, by adjusting the light toward the negative the negative will be illuminated with increasing intensity and the illumination may be subdued by adjusting the light in a direction away from the negative. Also the degree of enlargement may be varied by adjusting the mirror toward or from the negative. Furthermore, by angularly adjusting the light and likewise varying the angular position of the mirror, any desired portion of the negative may be brought out in the greatest detail.

In that embodiment of the invention shown in Fig. 3 of the drawings, the source of light, indicated by the numeral 43 is mounted at the upper end of a semi-rigid and universally adjustable arm 44 similar to arms employed in supporting desk lamps, and, of course, by bending this arm in one direction or another the light may be directed at any desired angle and may be adjusted toward or from the negative holder indicated in Fig. 5 by the numeral 45. The light screen is indicated by the numeral 46, and the said negative holder and light screen are positioned between the source of light 43 and an arm 47 corresponding to the arm 44 and supporting a mirror 48 which mirror may be also adjusted due to the nature of the supporting arm 47 therefor.

While the screen 40 is above described as formed with an opening 42 and this arrangement is preferable where the screen and negative holder are arranged in the manner shown in Figs. 1 and 2 of the drawings, nevertheless if the screen and negative holder are transposed it will be advisable to cover the opening 42 with a pane of translucent material such as ground glass or the like.

It is preferable that the front 35 of the negative holder be, as stated, of translucent material so that the light rays will be diffused. Of course, if desired this pocket may be of transparent material and a sheet of translucent material may be introduced into the pocket with the negative.

If found desirable, instead of so mounting the source of light that the same may be adjusted toward and from the negative holder,

any suitable form of rheostat or dimming device may be employed for diminishing or increasing the intensity of the light.

Having thus described the invention, what is claimed as new is:

1. In apparatus for the examination of negatives, means for supporting a negative, a source of light mounted for universal adjustment at one side of the means, and a uniformly magnifying mirror at the other side of the said means.

2. In apparatus for the examination of negatives, means for supporting a negative, a source of light at one side of the means, and a uniformly magnifying mirror horizontally pivoted at the other side of the said means.

3. In apparatus for the examination of negatives, means for supporting a negative, a source of light at one side of the means adjustable with relation thereto, and a mirror at the other side of the said means also adjustable with relation thereto.

4. In apparatus for the examination of negatives, means for supporting a negative, a source of light mounted for universal adjustment at one side of the means, a uniformly magnifying mirror at the other side of the means mounted for universal adjustment, and a light screen between the negative support and the mirror.

5. In apparatus for the examination of negatives, means for supporting a negative, a source of light at one side of the said means adjustable angularly with relation thereto for illuminating portions of the negative in detail, and a uniformly magnifying mirror at the other side of the said means.

6. In apparatus for the examination of negatives, means for supporting a negative, a source of light mounted for universal movement at one side of the means adjustable toward and from the means, and a mirror at the other side of the said means.

7. In apparatus for the examination of negatives, means for supporting a negative, a source of light at one side of the means, and a uniformly magnifying mirror at the other side of the means adjustable vertically and angularly with relation thereto.

8. In apparatus for the examination of negatives, means for supporting a negative, a source of light at one side of the means, and a uniformly magnifying mirror at the other side of the said means angularly adjustable with relation thereto.

9. In apparatus for the examination of negatives, means for supporting a negative, a source of light at one side of the means adjustable toward and from the means and angularly with relation thereto, and a magnifying mirror at the other side of the said means adjustable toward and from the same.

10. In apparatus for the examination of negatives, means for supporting a negative, a source of light at one side of the means adjustable toward and from the means and angularly with relation thereto, and a magnifying mirror at the other side of the said means adjustable toward and from the same and angularly with relation thereto.

11. In apparatus for the examination of negatives, a negative support, a source of light at one side of the support adjustable toward and from the said support, adjustable vertically, and adjustable angularly with relation to the support, and a uniformly magnifying mirror at the other side of the said support and being horizontally pivoted.

12. In apparatus for the examination of negatives, means for supporting a negative, a source of light at one side of the means, and a mirror at the other side of the means having a concave face and an opposite plane face, the said mirror being reversible.

13. In apparatus for the examination of negatives, means for supporting a negative, a source of light at one side of the means, and a mirror at the other side of the means having a magnifying face and an opposite plane face, the said mirror being reversible and angularly adjustable.

14. In apparatus for the examination of negatives, means for supporting a negative, a source of light at one side of the means, a uniformly magnifying mirror at the other side of the means, a light screen between the negative support and the mirror, and a light diffusing sheet between said support and said mirror.

15. In apparatus for the examination of negatives, a negative support, a source of light at one side of the support, a mirror at the other side of the support, a light screen between the negative support and the mirror, the light screen being of opaque material and having an opening in line with the negative for the passage of light rays from the negative, and a light diffusing sheet between said support and said mirror.

16. In apparatus for the examination of negatives, a negative support, a source of light at one side of the support mounted for universal adjustment, and a mirror at the other side of the said support also mounted for universal adjustment.

17. In apparatus for the examination of negatives, means for supporting a negative, a source of light at one side of the means and a mirror at the other side of the means having on one side a mirror face of one character and on the other side a mirror face of another character, the said mirror being reversible.

18. In apparatus for the examination of negatives, a negative support, a source of light at one side of the support, a mirror at

the other side of the said support having a concave face and a plane face, and a hood separably connected with the mirror and adaptable to either face thereof.

19. In apparatus for the examination of negatives, a negative support including a plate having an opening, a light diffusing sheet covering the opening, and means upon the said sheet for the support of a negative within the said opening.

20. In apparatus for the examination of negatives, means for supporting a negative, a source of light at one side of the means and adjustable with relation thereto, a mirror at the other side of the said means and adjustable with relation thereto, and a light screen between the negative support and the mirror.

21. In apparatus for the examination of negatives, a negative holder including a plate having an opening, and a holder proper including a front having its marginal portions provided with pockets to receive the side margins of the negative to be held, the said holder proper being secured to the said plate opposite the opening.

22. In apparatus for the examination of negatives, a negative support including a plate having an opening, and a negative holder proper including a front of light transmitting material having its lateral portions folded inwardly to provide pockets to receive the side margins of the negative to be held, and thence folded outwardly to provide flanges secured to the face of the said plate at the opposite sides of the opening therein.

23. In apparatus for the examination of negatives, a negative support including a plate having an opening, and a negative holder proper including a front of light transmitting material having its lateral portions folded inwardly to provide pockets to receive the side margins of the negative to be held, and thence folded outwardly to provide flanges secured to the face of the said plate at the opposite sides of the opening therein, the lower edge portion of the said front being folded rearwardly and upwardly to provide a bottom for the said pocket.

24. In apparatus for the examination of negatives, a negative support including a plate having an opening, a light diffusing sheet covering the area of the opening, and means for supporting a negative within the said opening.

25. An apparatus for the examination of negatives including a negative support, a mirror having magnifying and reducing faces, and means whereby the different faces of the mirror may be presented individually to the negative carried by said support.

26. An apparatus for the examination of negatives including a negative support, a mirror having magnifying and reducing faces, means whereby the different faces of the mirror may be individually presented to the negative carried by said support, and a hood adapted to be interchangeably arranged about either face of the mirror.

27. In apparatus for the examination of negatives, means for supporting a negative, a source of light at one side of the means and adjustable with relation thereto, a mirror at the other side of the means and adjustable with relation thereto, and an opaque member between said means and said mirror and having an opening in line with said mirror and the negative carried by said support.

In testimony whereof I affix my signature.

ELZA R. STEALY. [L. S.]