E. P. CROCKER & A B PAYNE.

STEREOSCOPE.

APPLICATION FILED JAN. 8, 1908.

907,973. Patented Dec. 29, 1908.

5 SHEETS—SHEET 1.

Fig. 1.

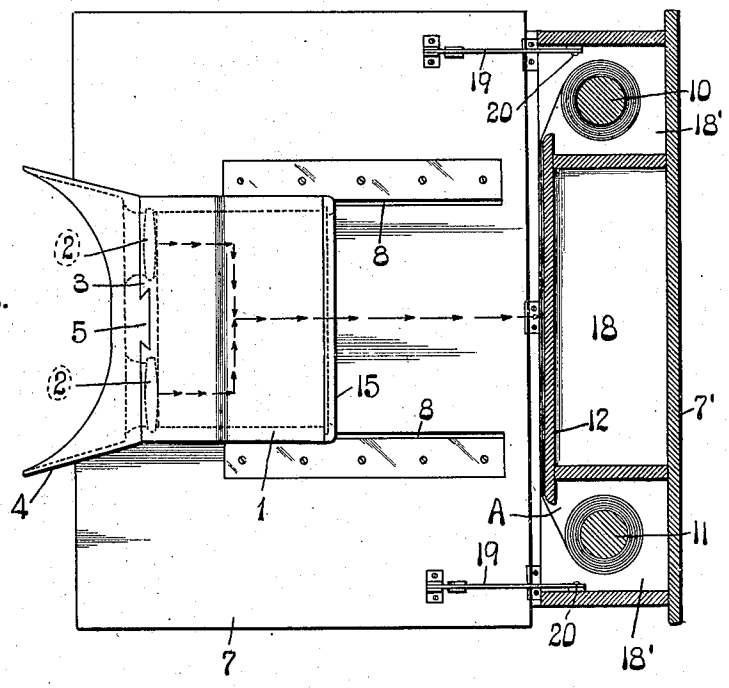
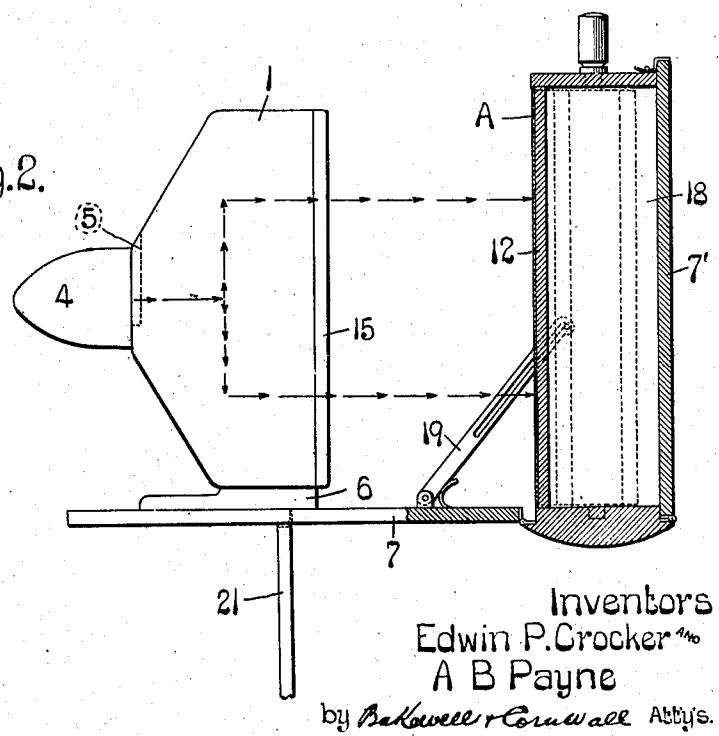


Fig. 2.



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5 SHEETS—SHEET 2.

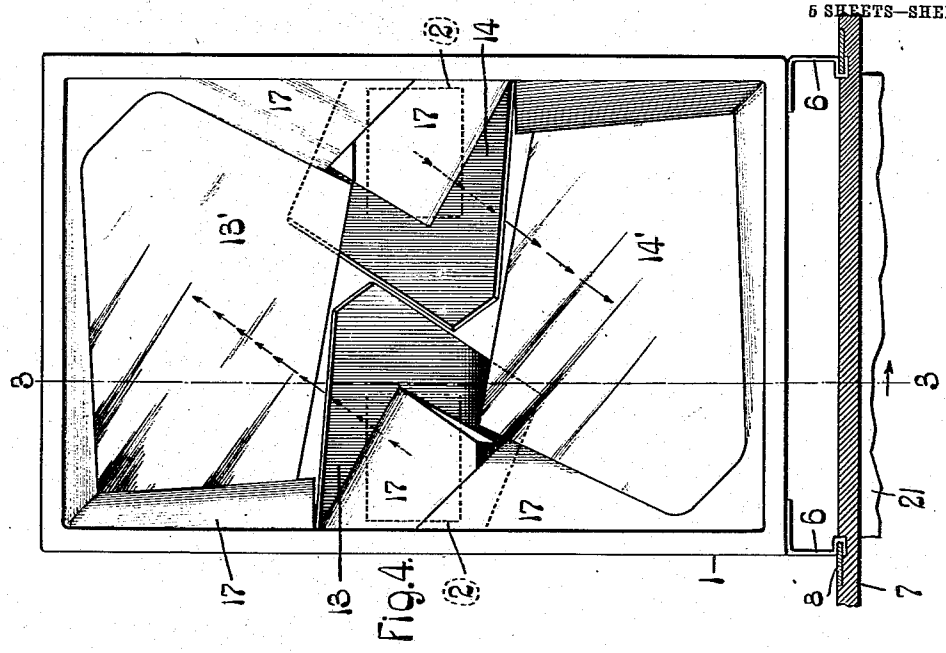


Fig. 4.

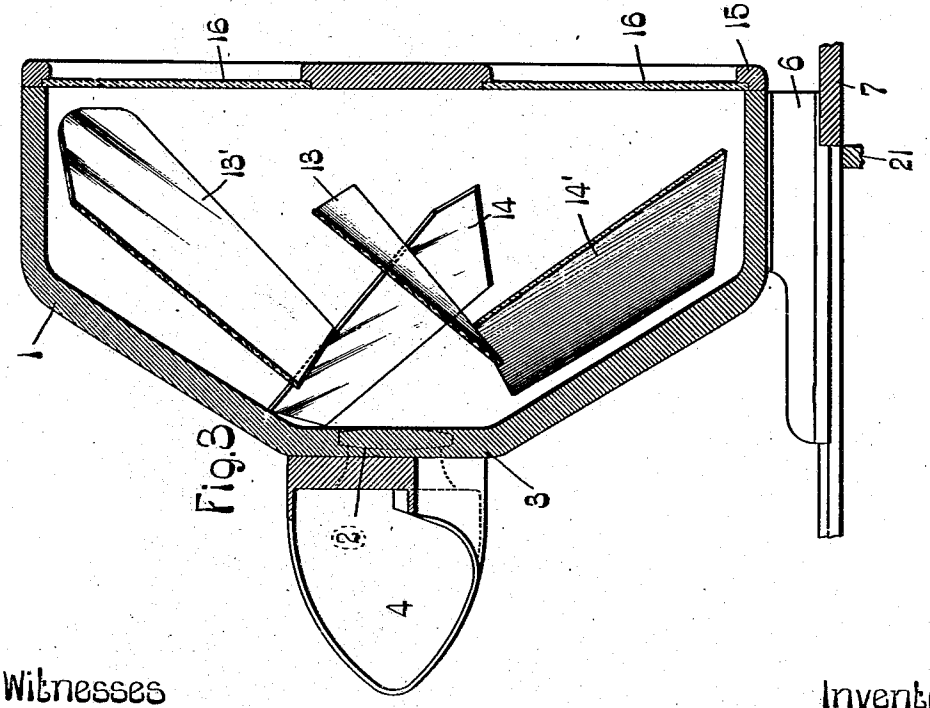


Fig. 3.

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5 SHEETS—SHEET 3.

Fig.5.

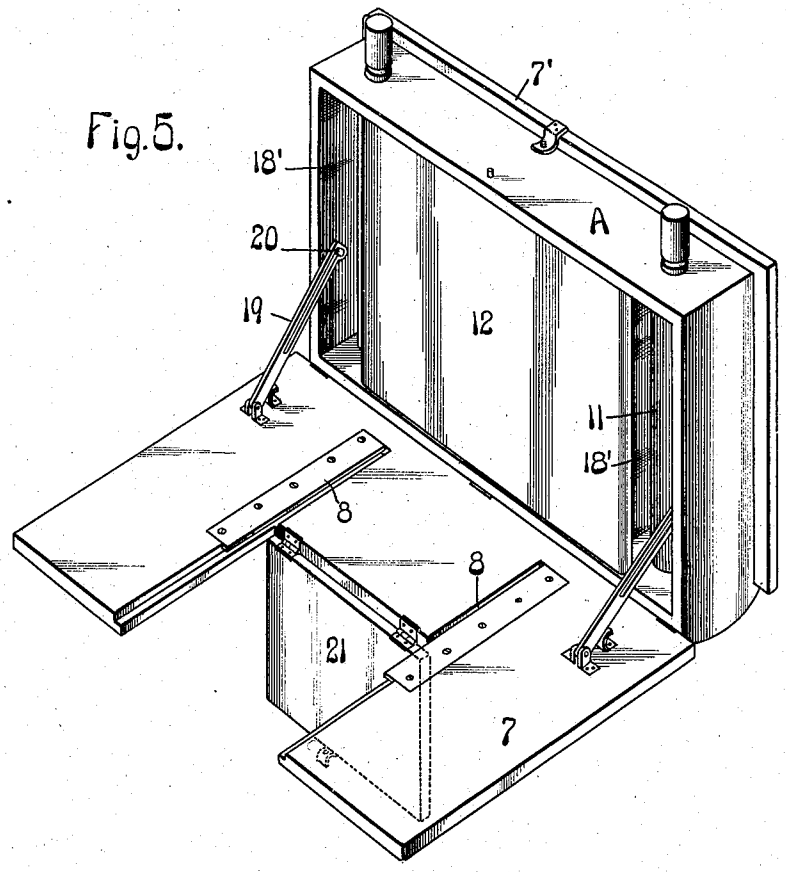
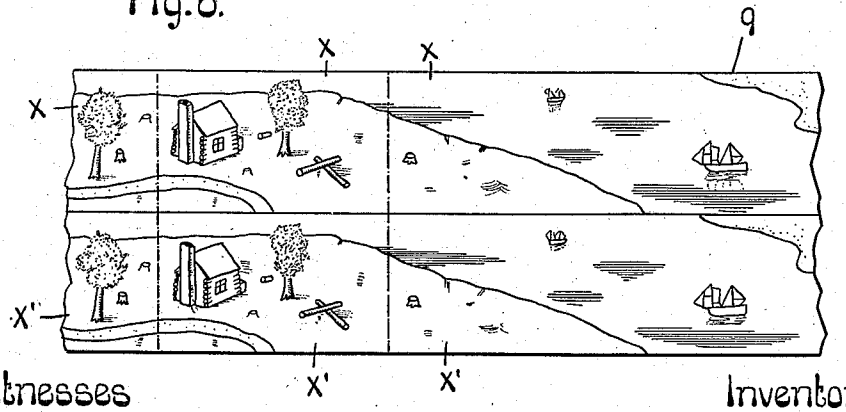


Fig.6.



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5 SHEETS—SHEET 4.

Fig. 7.

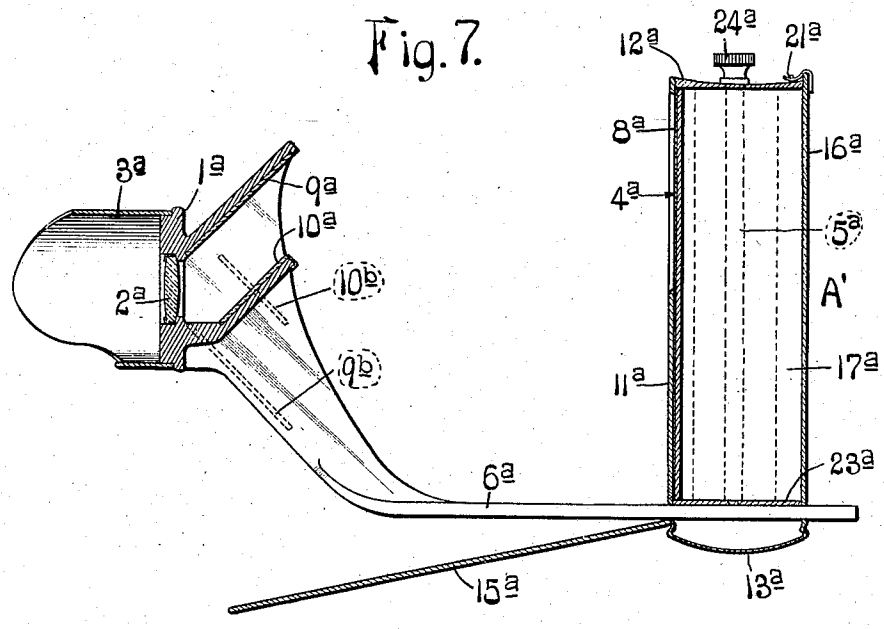
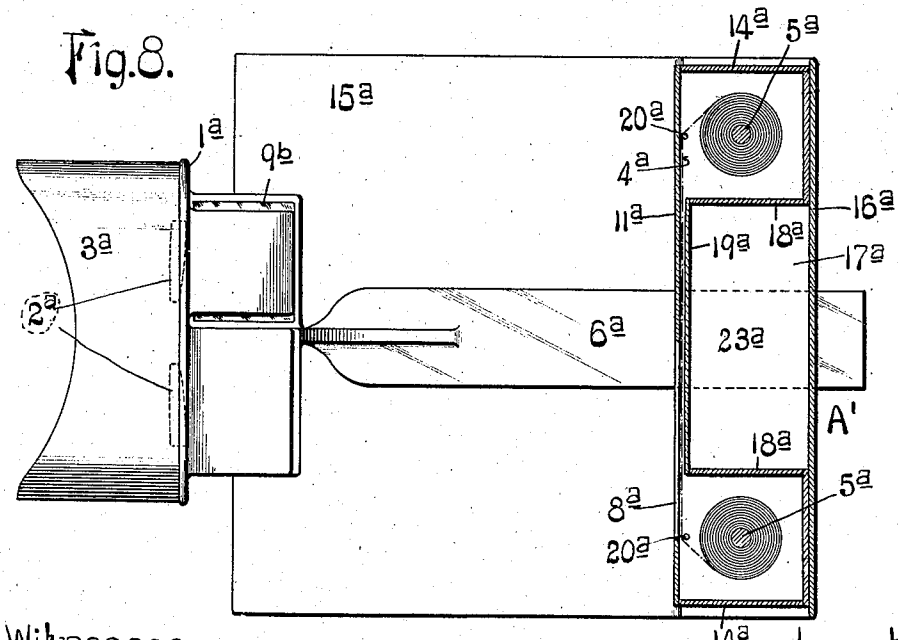


Fig. 8.



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5 SHEETS—SHEET 5.

Fig. 9.

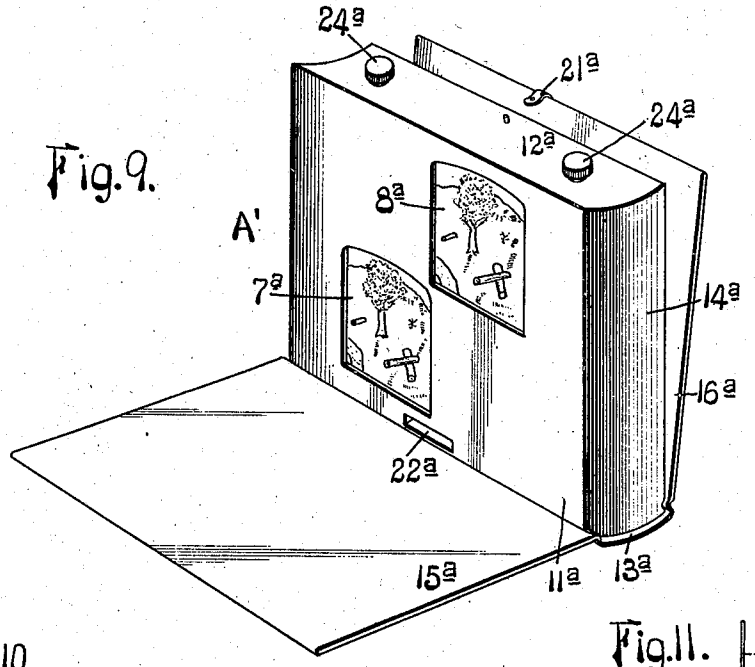


Fig. 10.

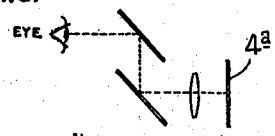


Fig. 11.

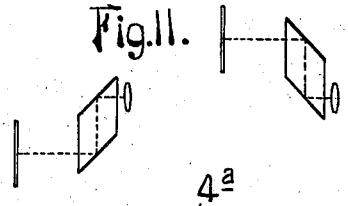
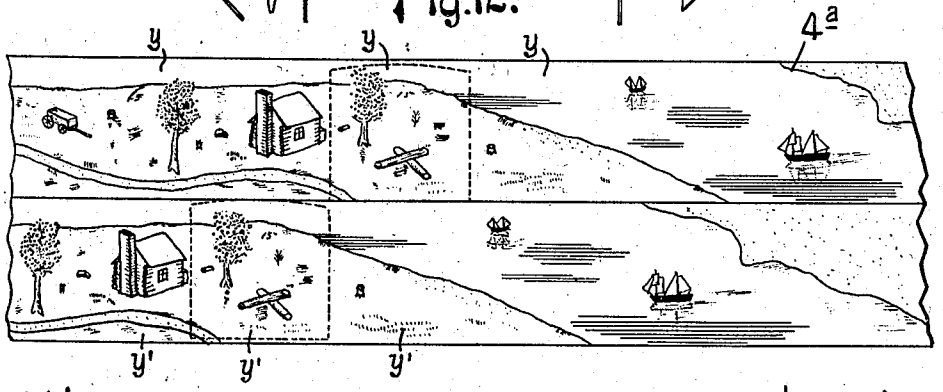


Fig. 12.



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UNITED STATES PATENT OFFICE.

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STEREOSCOPE.

No. 907,973. Specification of Letters Patent. Patented Dec. 29, 1908.

Application filed January 8, 1908. Serial No. 409,778.

To all whom it may concern:

Be it known that we, EDWIN P. CROCKER and A B PAYNE, both citizens of the United States, residing at Rochester, New York, and Webster Groves, Missouri, respectively, have invented a certain new and useful Improvement in Stereoscopes, of which the following is a full and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a top plan view of a stereoscope constructed in accordance with our invention, the picture holder being in section so as to more clearly show the construction of same; Fig. 2 is a side elevation of the device shown in Fig. 1, with the picture holder in vertical section; Fig. 3 is an enlarged vertical sectional view of the lens-holder taken on the line 3—3 of Fig. 4; Fig. 4 is a rear elevation of the lens-holder with the rear wall of same removed for the purpose of clearly illustrating the positions of the reflecting mirrors; Fig. 5 is a perspective view of the picture-holder; Fig. 6 shows a portion of one form of picture strip that can be used in our stereoscope; Fig. 7 is a sectional view of a modified form of our invention; Fig. 8 is a top plan view, partly in section, of the stereoscope shown in Fig. 7; Fig. 9 is a perspective view of the picture-holder used with said stereoscope; Fig. 10 is a diagrammatic view showing one way in which the reflecting mirrors can be arranged; Fig. 11 is a diagrammatic view showing prisms used in place of the reflecting mirrors; and Fig. 12 shows a slightly different form of picture strip from that shown in Fig. 6.

This invention relates to stereoscopes.

The main object of our invention is to provide an inexpensive and light-weight optical device which is so constructed that it will displace pictures or images located in different horizontal planes or different vertical and horizontal planes, into apparent optical coincidence.

Another object of our invention is to provide a stereoscope which will increase the stereoscopic field of vision from approximately three inches up to or over five inches and thus permit picture units of over three inches in width to be viewed through the stereoscope. And still another object of our invention is to provide a simple and compact device or holder for handling and protecting the pictures or views that are to be examined through the stereoscope, said holder being preferably constructed to represent a book and provided with a chamber for receiving a pamphlet or description of the views or pictures in the holder.

The pictures that are used with the stereoscope herein shown differ from the ordinary stereoscope picture in that each picture is composed of two substantially identical picture units arranged in different horizontal planes and either in the same or different vertical planes as hereinafter described. Preferably, said picture units are arranged on a continuous strip or a plurality of parallel continuous strips that are caused to move transversely across the lenses of the stereoscope so as to produce a panoramic effect. The stereoscope can be used, however, with a picture consisting of two substantially identical picture units arranged in different horizontal planes on a card that is held stationary when the picture is being examined.

Referring to Figs. 1 to 5 of the drawings which illustrate the preferred form of our present invention, 1 designates a hollow member having ordinary stereoscopic lenses 2 arranged in its front wall 3. A hood 4 is also connected to said front wall and we prefer to detachably secure said hood in position as, for example, by providing it with a dove-tailed rib 5 that coöperates with a dove-tailed groove in the front wall of the member 1, as shown in Fig. 1, so that the hood can be detached when the stereoscope is to be packed in its case. It is immaterial, however, so far as our broad idea is concerned, how the hood is retained in position, and if desired, it could be permanently connected to the member 1. The member 1 is provided on its lower side with flanges or guides 6 that coöperate with guides or tracks on the device which supports said member. The strip or film on which the pictures are mounted is arranged inside of a book-shaped holder A provided with a hinged wall or cover 7 that can be moved or dropped into the position shown in Figs. 2 and 5 to form a support for the lens-holder 1, said wall being

provided with tracks or guides 8 that are engaged by the guides 6 on the member 1 so as to enable said member to be moved toward and away from the picture-holder.

In Fig. 6 we have shown a portion of one form of picture strip that can be used with our stereoscope, the pictures on said strip being each composed of two picture units X and X′ arranged in different horizontal planes and in the same vertical planes. We wish to have it clearly understood, however, that our improved stereoscope is not limited in its use to a continuous picture strip or to a picture in which the two picture units are arranged in the same vertical plane as said picture units could be arranged in different vertical planes or partly in the same vertical plane and partly in different vertical planes as, for example, by having one picture unit overlap or extend over the other picture unit. The strip 9 which contains the picture units and which we will hereinafter refer to as the "picture strip" is wound upon two vertically disposed rolls 10 and 11 mounted in the holder A, as shown in Figs. 1 and 5, said holder being provided with a guide or support 12 over which the picture strip travels.

The member 1 in which the lenses are mounted is provided with a pair of parallel reflecting mirrors for each lens, said mirrors being so disposed that both picture units of each picture will appear to be in the same horizontal plane. As shown in Fig. 3, the pair of mirrors 13 and 13′ that are arranged in front of the right lens are inclined upwardly relatively to said lens, and the pair of mirrors 14 and 14′ that are arranged in front of the left lens are inclined downwardly relatively to said left lens. Consequently, the image of the upper picture unit X on the picture strip will be reflected onto the mirror 13′ and then onto the mirror 13 which is located in alinement with the right lens and the image of the lower picture unit X′ will be reflected onto the mirror 14′ and then onto the mirror 14 which is located in alinement with the left lens so that both picture units on the picture strip will appear to be in the same horizontal plane. The pair of parallel mirrors 13 and 13′ for the right lens in addition to being inclined upwardly, are also arranged at an angle oblique to a longitudinal vertical plane, as shown in Fig. 3, so that the path of light from the upper picture unit X will be swerved downwardly and also to the right so as to throw the image of the upper picture unit onto the mirror 13 which is smaller than the mirror 13′. The inclined mirrors 14 and 14′ for the left lens are also arranged at an angle oblique to a longitudinal vertical plane but at an opposite angle to that in which the mirrors 13 and 13′ are arranged so that the path of light from the lower picture unit X′ will be swerved upwardly and to the left to throw the image of the lower picture unit X′ onto the mirror 14, as indicated by the arrows in Figs. 1 and 2. The advantage of arranging the reflecting mirrors in this manner is that we are able to use pictures in which the upper and lower picture units overlap or lie in the same vertical plane for the field of vision of each lens is approximately five inches instead of three inches as in the stereoscopes heretofore in use, the reflecting mirrors 13′ and 14′ extending approximately the full width of the lens-holder 1. Instead of arranging the reflecting mirrors as herein shown they could be so arranged that the right eye of the person looking through the stereoscope would see the lower picture unit and the left eye would see the upper picture unit. The rolls 10 and 11 are provided at their upper ends with finger-pieces by which said rolls can be turned so as to cause the picture strip to pass through the visual plane and thus produce a perfect panoramic effect, the picture strip either being provided with one long continuous picture or a plurality of individual pictures with no blank spaces between the picture units. While we prefer to have the two picture units of each picture mounted on a single strip or film it will, of course, be understood that two parallel strips each containing one picture unit of the picture, could be used without departing from the spirit of our invention, the two strips, of course, being moved at the same speed.

We have herein shown the lens-holder 1 as being provided with a detachable cover or wall 15 having openings which are covered by pieces of glass 16 so as to prevent dust and dirt from getting on the reflecting mirrors for the lens. Said reflecting mirrors may be secured in position by any suitable means as, for example, by blocks 17, as shown in Fig. 4, and the inside of the member 1 is blackened.

The picture-holder A which forms one of the novel features of our invention, is shown in detail in Fig. 5, said holder being preferably constructed to represent a book and having one hinged cover or wall 7, as previously described, which forms a support for the lens-holder 1, and a hinged wall or cover 7′ that forms a closure for a chamber 18 which is adapted to hold a pamphlet or description of the pictures on the picture strip, said chamber being located between two chambers 18′ in which the picture strip rolls 10 and 11 are arranged as shown in Fig. 1. The cover or wall 7 is retained in its open or dropped position, as shown in Fig. 5, by any suitable means as, for example, by slotted links 19 connected to the cover and receiving pins 20 on the end walls of the member A, and the cover 7 is also provided with a hinged section 21 that can be dropped into the position shown in Fig. 5 so as to provide a clearance for the lower portion of the face of the person who

uses the stereoscope when the lens-holder 1 is adjusted up close to the picture-holder A.

In Figs. 7 to 12 we have shown a slightly modified form of our invention wherein the reflecting mirrors for the lenses are inclined upwardly and downwardly relatively to their respective lenses but are not arranged at an angle oblique to a longitudinal vertical plane, thus permitting the use of a picture strip in which the upper and lower picture units are arranged only in different vertical planes, as shown in Fig. 12.

Referring to Fig. 7, 1^a designates a member having ordinary stereoscopic lenses 2^a mounted therein, and 3^a is a hood secured to said member. The picture strip 4^a which is similar to the picture strip shown in Fig. 6 except that the picture units Y and Y′ of each picture are arranged in different vertical planes, is wound on the rolls 5^a of the picture-holder A′ that is adjustably mounted on a base or support 6^a projecting forwardly from the lens-holder 1^a. The front wall of the picture-holder A′ is provided with openings 7^a and 8^a to expose the upper and lower picture units of each picture, the opening 7^a being located opposite the left lens and in a lower horizontal plane than the opening 8^a which is located opposite the right lens. The lenses 2^a are so located relatively to the picture strip that their transverse centers are on a line with the center of said strip. A reflecting face, preferably a mirror 9^a, is arranged in front of the right lens, said mirror being inclined upwardly from the upper edge of the lens so that the rays of light will be deflected in a straight line from the upper picture unit onto said mirror. A second reflecting surface or mirror 10^a inclines upwardly from the lower edge of the right lens parallel to the mirror 9^a so that the image of the picture unit shown on the mirror 9^a will be reflected onto the mirror 10^a and thus come within the vision of the right eye of the person looking through the stereoscope.

A pair of parallel reflecting faces or mirrors 9^b and 10^b are arranged in front of the left lens, as shown in dotted lines in Fig. 7, but the mirrors for the left lens are disposed oppositely to the mirrors for the right lens so that the rays of light will be deflected in a direct line from the lower picture units of the picture strip onto the mirror 9^b and thence onto the mirror 10^b so as to come within the vision of the left eye of the person looking through the stereoscope, thereby bringing both units into apparent optical coincidence and producing a single picture. Instead of arranging the reflecting mirrors between the picture strip and the lenses, said mirrors can be arranged between the eyes of the person looking at the picture and the lenses of the stereoscope, as shown in Fig. 10.

While we prefer to use parallel mirrors, as shown in Fig. 7, we do not wish to be understood as limiting our invention to the use of mirrors as we could accomplish the same result with prisms having parallel faces, and in Fig. 11 we have illustrated prisms that we could use in place of the mirrors. The picture-holder in this form of our invention is similar to the picture-holder shown in Fig. 5, and comprises a front wall 11^a, top and bottom walls 12^a and 13^a, end walls 14^a, and a rear wall, the bottom wall being constructed to represent a book-back and having two hinged covers 15^a and 16^a connected thereto. The rear wall does not extend in a straight line from end wall to end wall but is of irregular shape, as shown in Fig. 8, so that a chamber 17^a will be provided for receiving a pamphlet or description of the views on the picture strip, the cover 16^a forming a lid or closure for this chamber 17^a. The portions 18^a of the rear wall extend parallel to the end walls 14^a and form two chambers in which the winding shafts 5^a are disposed, and the portion 19^a of the rear wall extends parallel to the front wall so as to form a guideway for the picture strip which passes over vertically disposed guide rods 20^a arranged adjacent the outer side edges of the openings 7^a and 8^a.

While we have herein illustrated two forms of picture-holders we do not wish it to be understood that this feature of our invention is limited to these exact constructions as our broad idea consists in a holder resembling a book and provided with a chamber or space to hold the descriptive matter which accompanies the picture strip. The back cover 16^a is provided with a snap or attaching device 21^a that retains said cover in closed position, and openings 22^a are formed in the front wall 11^a and in the back cover 16^a to receive the base piece 6^a which supports the picture-holder, the holder being provided with a piece 23^a that bears upon the base piece 6^a. When the stereoscope is not in use the picture-holder can be placed in a book-case and when it is desired to examine the views the front cover 15^a is opened into the position shown in Figs. 7 and 8, and the base piece 6^a slipped through the openings 22^a, the picture-holder being adjusted at the proper distance from the lenses. The winding shafts 5^a are journaled in the piece 23^a and in the top wall 12^a and are provided at their upper ends with knurled knobs 24^a which the operator turns to cause the picture strip to travel past the lenses and thus produce a panorama. The front wall 11^a of the holder is also hinged so that it can be swung open to permit the picture strip to be attached to the winding shafts.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. A stereoscope adapted to hold a picture comprising picture units that are arranged in

different horizontal planes, and provided with reflecting surfaces which are so arranged that they will displace said picture units into apparent optical coincidence; substantially as described.

2. A stereoscope provided with means for supporting a picture comprising images or picture units located in different horizontal planes, lenses, and reflecting surfaces so arranged relatively to the lenses that they will displace the images or picture units of said picture into apparent optical coincidence; substantially as described.

3. A stereoscope provided with lenses, a picture comprising picture units that are arranged in different horizontal planes, and reflecting surfaces for displacing said picture units into apparent optical coincidence; substantially as described.

4. A stereoscope provided with means for holding a picture that comprises a pair of picture units arranged in different horizontal planes, said stereoscope being provided with inclined reflecting surfaces which cause both picture units to appear to be in optical coincidence; substantially as described.

5. A stereoscope provided with lenses, and a pair of parallel reflecting surfaces coöperating with each lens for displacing images or pictures located in different horizontal planes into apparent optical coincidence; substantially as described.

6. A stereoscope provided with lenses, an inclined reflecting surface coöperating with one lens and an oppositely inclined reflecting surface coöperating with the other lens so as to displace pictures or images located in different horizontal planes into apparent optical coincidence; substantially as described.

7. A stereoscope provided with lenses, and a pair of parallel inclined reflecting surfaces coöperating with each lens, the reflecting surfaces for one lens being inclined oppositely to the reflecting surfaces for the other lens so that pictures or images located in different horizontal planes will be displaced into apparent optical coincidence; substantially as described.

8. A stereoscope provided with a picture that is composed of two picture units located in different horizontal planes, and two pairs of reflecting surfaces arranged in front of the picture and so disposed relatively thereto that both picture units will appear to lie in the same horizontal plane; substantially as described.

9. A stereoscope provided with lenses and inclined reflecting surfaces which are so arranged relatively to said lenses that they will displace pictures or images located in different horizontal planes and in the same vertical plane into apparent optical coincidence; substantially as described.

10. A stereoscope adapted to be used with a picture comprising picture units that are arranged in different horizontal planes and partly in the same vertical plane, said stereoscope being provided with lenses and inclined reflecting surfaces arranged at an angle oblique both to a longitudinal horizontal and to a longitudinal vertical plane so that the stereoscopic field of vision will be greater than the distance between the centers of said lenses; substantially as described.

11. A stereoscope provided with a picture composed of a pair of picture units arranged in different horizontal planes, lenses, and means for causing both units of the picture to appear to lie in the same horizontal plane; substantially as described.

12. A stereoscope provided with lenses, and reflecting surfaces so disposed relatively to the lenses that the light for one lens will be swerved upwardly and laterally and the light for the other lens will be swerved downwardly and in the opposite lateral direction, thereby permitting the use of picture units that are wider than the distance between the centers of said lenses; substantially as described.

13. A stereoscope provided with lenses, and a pair of parallel inclined reflecting surfaces coöperating with each lens, the reflecting surfaces for one lens being arranged at an angle oblique to a longitudinal vertical plane, and the other pair of reflecting surfaces also being arranged at an angle oblique to a longitudinal vertical plane but at an opposite angle to the reflecting surfaces first referred to; substantially as described.

14. A stereoscope provided with lenses, a picture arranged in front of said lenses and composed of picture units that are located in different horizontal planes and in the same vertical planes, and means for displacing said picture units into apparent optical coincidence; substantially as described.

15. A stereoscope comprising a member provided with lenses, a picture holder arranged in front of said member for supporting a picture made up of picture units that are located in different horizontal planes, and reflecting surfaces for deflecting said picture units into apparent optical coincidence; substantially as described.

16. A stereoscope comprising a member provided with lenses and a pair of inclined reflecting surfaces arranged in front of each lens, the reflecting surfaces for one lens being disposed oppositely to the reflecting surfaces for the other lens, a picture-holder arranged in front of said reflecting surfaces, and a picture strip mounted in said holder and provided with picture units that are located in different horizontal planes; substantially as described.

17. A stereoscope comprising a hollow member having ordinary stereoscopic lenses mounted in its front wall, and a pair of parallel inclined mirrors mounted inside of

said member in front of each lens, the mirrors for one lens being disposed oppositely to the mirrors for the other lens so as to displace pictures or images located in different horizontal planes into apparent optical coincidence; substantially as described.

18. A stereoscope comprising a closed hollow member having ordinary stereoscopic lenses mounted in one wall thereof, the opposite wall of said member being provided with openings which are covered by glass plates, a pair of parallel mirrors arranged inside of said member and inclined upwardly relatively to one lens, and a pair of parallel mirrors arranged inside of said member and inclined downwardly relatively to the other lens, one pair of mirrors being arranged at an angle oblique to a longitudinal vertical plane and the other pair of mirrors being arranged at an angle oblique to a longitudinal vertical plane but at an opposite angle to the pair of mirrors first referred to; substantially as described.

19. A stereoscope comprising a lens-holder having lenses and a pair of inclined reflecting mirrors arranged in front of each lens, a hood detachably connected to said lens-holder, and a picture holder to which said lens-holder is adapted to be connected; substantially as described.

20. A stereoscope comprising a picture-holder provided with rolls on which a picture strip is wound, a hinged cover and means for holding it in open position, and a lens-holder adjustably mounted on said cover, said cover being provided with a hinged section which can be dropped when the lens-holder is arranged close to the picture strip; substantially as described.

21. A stereoscope comprising lenses, a picture strip containing picture units that are located in different horizontal planes, means for moving said picture strip transversely of the lenses, and reflecting surfaces coöperating with the lenses to displace said picture units into apparent optical coincidence; substantially as described.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses, this 29th day of November, 1907.

EDWIN P. CROCKER.

Witnesses:
CHESTER C. JOSLAN,
GEO. S. MCMILLAN.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses, this 27th day of December, 1907.

A B PAYNE.

Witnesses:
J. E. GOATREMONT,
A. FRANK WARREN.