

Oct. 12, 1943.

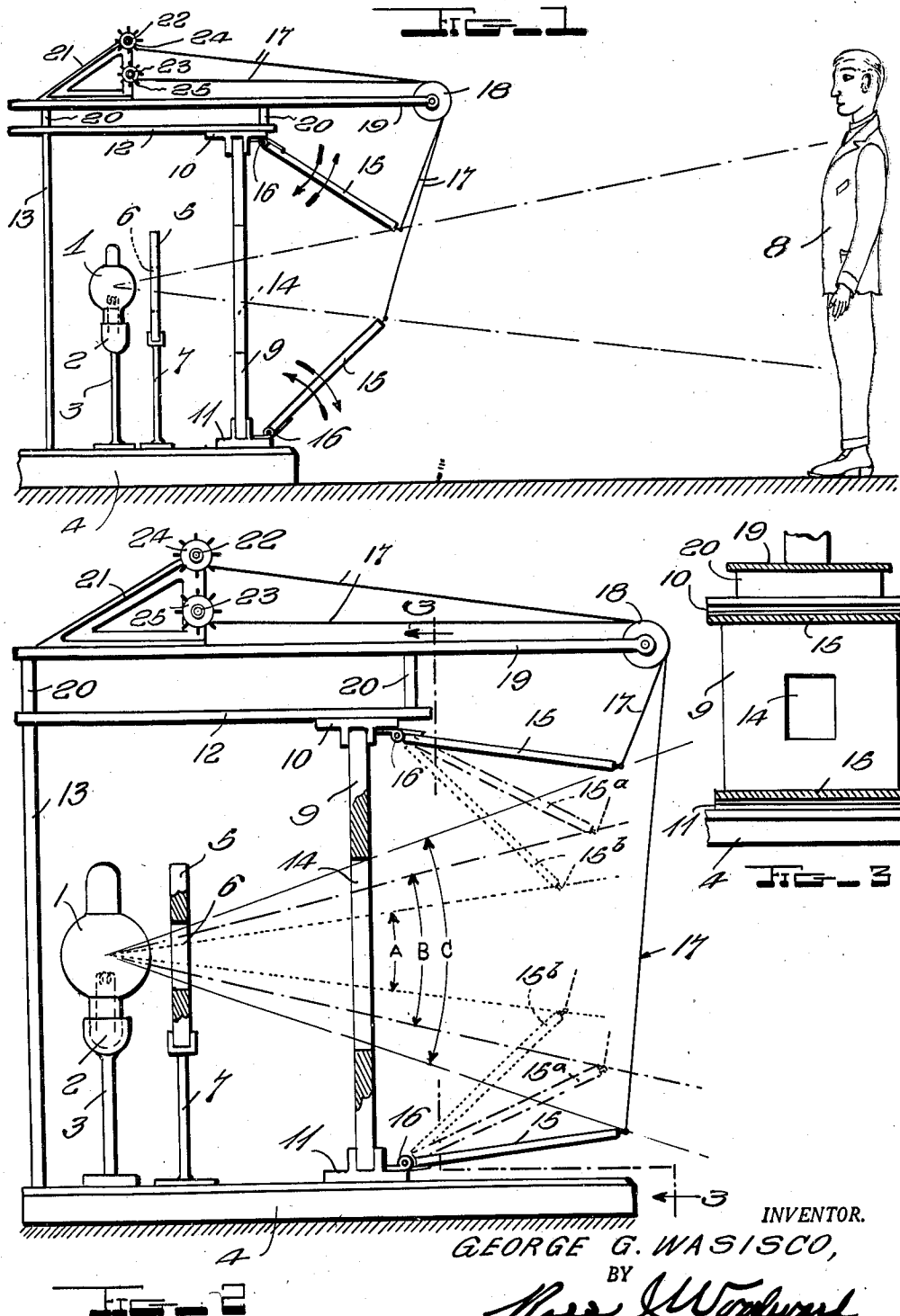
G. G. WAISCO

2,331,586

X-RAY SHIELD

Filed Nov. 18, 1941

3 Sheets-Sheet 1



INVENTOR.

GEORGE G. WASISCO,

BY

Harry J. Woodward

ATTORNEY

Oct. 12, 1943.

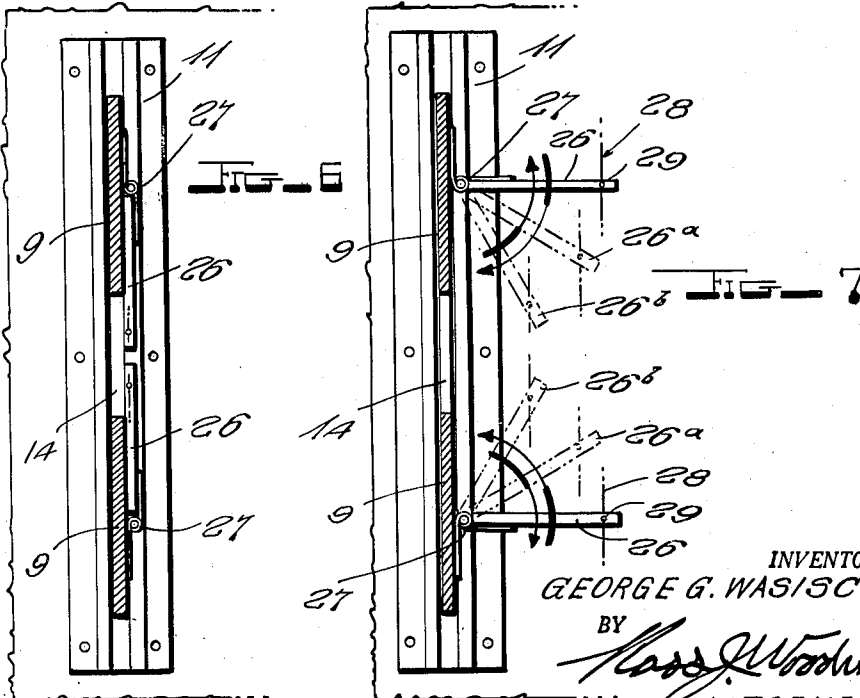
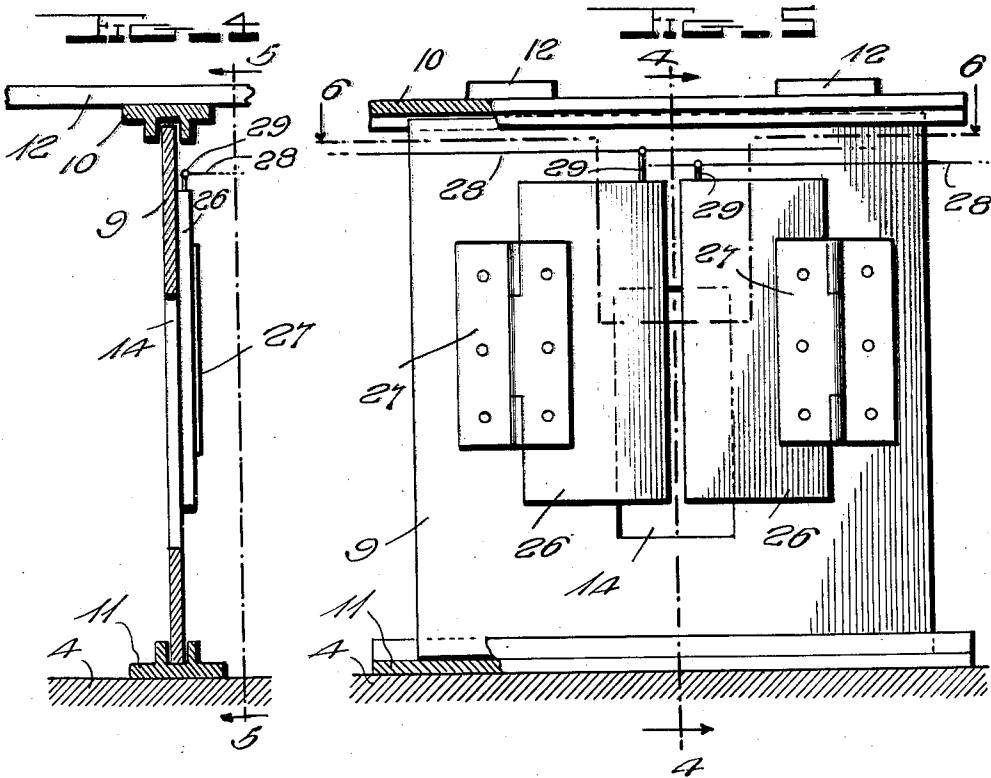
G. G. WAISCO

2,331,586

X-RAY SHIELD

Filed Nov. 18, 1941

3 Sheets-Sheet 2



INVENTOR.
GEORGE G. WAISCO,

BY

Harry J. Woodward
ATTORNEY

Oct. 12, 1943.

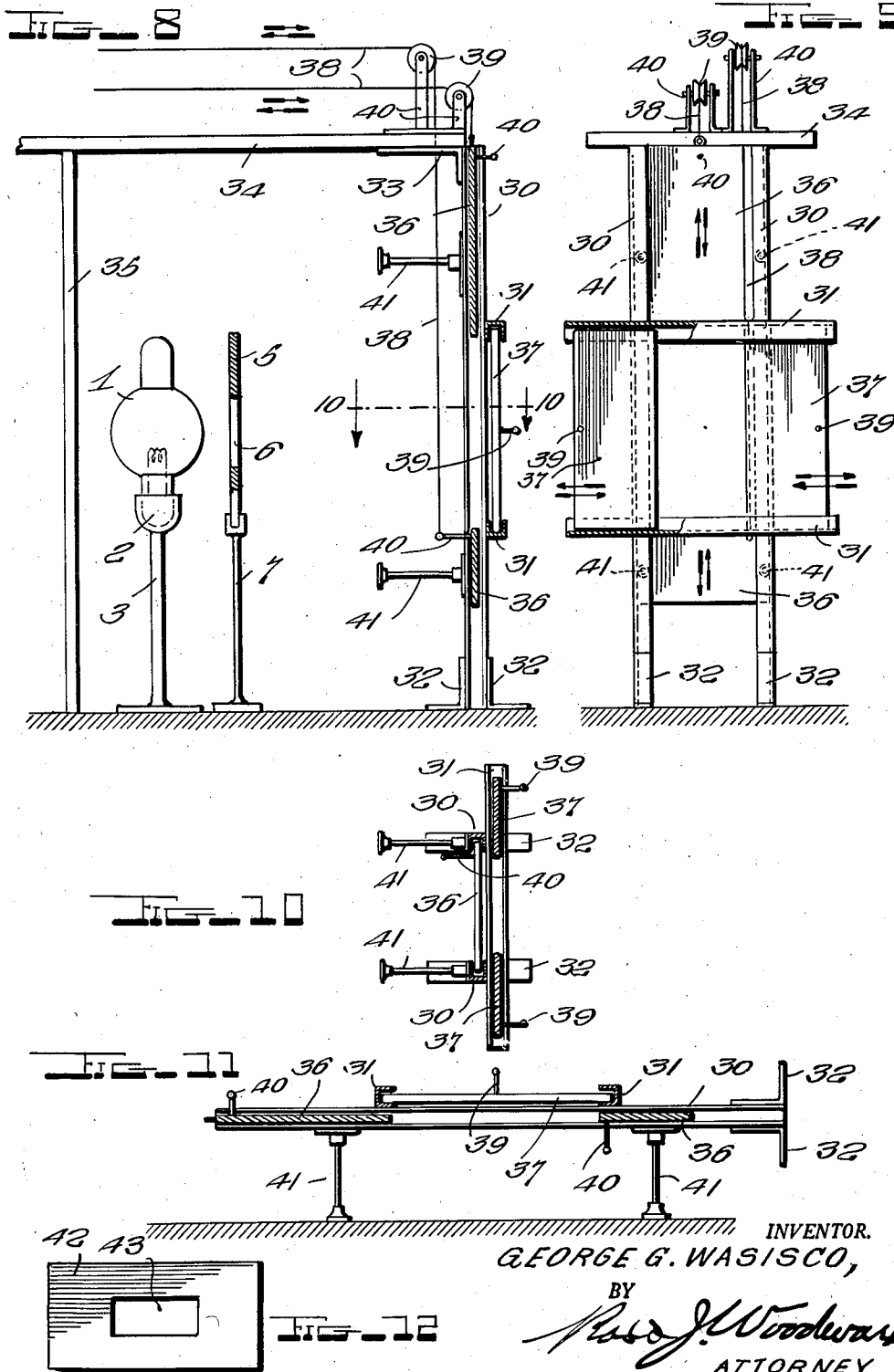
G. G. WAISCO

2,331,586

X-RAY SHIELD

Filed Nov. 18, 1941

3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE

2,331,586

X-RAY SHIELD

George G. Wasisco, Milwaukee, Wis.

Application November 18, 1941, Serial No. 419,625

3. Claims: (Cl. 250—105)

This invention relates to an X-ray shield and it is one object of the invention to provide a shield adapted to be mounted in front of an X-ray machine and serve very effectively to restrict the rays discharged from the Roentgen ray tube of an X-ray machine and thus cause the rays to strike only predetermined portions of a person's body while taking a picture or treating a person with an X-ray machine.

Another object of the invention is to provide a shield of such construction that shutters forming portions of the device may be easily moved from fully open position toward closed position and held in desired adjusted position while a picture is being taken or a patient treated.

Another object of the invention is to provide a shield capable of being set up for use in either a vertical or horizontal position according to whether are to stand or lie prone during the taking of a picture or while being treated.

Another object of the invention is to provide a shield which is simple in construction, easily adjusted, and not liable to become broken or get out of order.

In the accompanying drawing:

Fig. 1 is a side elevation showing a shield of the improved construction in position for use.

Fig. 2 is an enlarged view showing the shield principally in side elevation and partially in section.

Fig. 3 is a view on the line 3—3 of Fig. 2.

Fig. 4 is a sectional view taken vertically through a shield of modified construction, the view being taken on the line 4—4 of Fig. 5.

Fig. 5 is a front elevation of the modified form of shield, the view being taken on the line 5—5 of Fig. 4.

Fig. 6 is a sectional view on the line 6—6 of Fig. 5, showing the shutters closed.

Fig. 7 is a view similar to Fig. 6, showing the shutters open.

Fig. 8 is a view showing another modified form of shield partially in side elevation and partially in vertical section.

Fig. 9 is a front elevation of the shield shown in Fig. 8.

Fig. 10 is a sectional view taken horizontally on the line 10—10 of Fig. 8.

Fig. 11 is a view showing the shield of Figs. 8 and 9 in horizontal position.

Fig. 12 is a view of a modified form of shutter.

The improved shield constituting the subject matter of this invention is for use in connection with an X-ray machine which may be employed for taking pictures or for giving X-ray treat-

ments. During the taking of such pictures or the giving of such treatments, it is necessary to confine the Roentgen rays to the portion or portions of the body to be photographed or treated.

At the present time, this is accomplished by shields applied to the patient and such shields have been found unsatisfactory as they must be suspended in proper relation to the body of the patient and also of the proper size. In many instances, a shield made to fit one person will not fit another and it is then necessary to prepare another shield before a picture can be taken or a treatment given.

In Figs. 1, 2 and 3 of the drawings, there has been shown one embodiment of the invention and, in these figures, the numeral 1 indicates a Roentgen tube which may be of conventional construction and is mounted in a socket 2 of a stand 3 resting upon a base or platform 4. A lead plate 5, formed with an opening 6, is supported in front of the tube 1 by a stand 7 and, since the opening 6 is circular the rays emitted from the tube and passing through the opening will be in the form of a cone increasing in diameter forwardly of the tube.

The patient 8 to be photographed or treated, stands in front of the apparatus at a predetermined distance therefrom in the path of the cone of Roentgen rays and the rays must be controlled so that they strike only the portion of the patient's body to be photographed or treated. To control the rays, the shield is set up in front of the apparatus and includes a lead block or sheet 9 which is held in upright position by having its upper and lower ends engaged in frames 10 and 11 formed of steel or other suitable material, the frame 11 being supported on the base 4 and the frame 10 being secured to an upper support 12. The support 12 may be of solid formation or consist of a suitable number of strips, and the rear end portion of the support is mounted on a suitable number of uprights 13 resting upon the base. An opening 14 is formed through the block 9, centrally thereof, and while this opening is preferably rectangular in outline, it is to be understood that it may be of any shape desired. The opening 14 is in alignment with the opening 6 so that the cone of Roentgen rays may pass through it and is of such dimensions that it will accommodate the full cone of rays when unobstructed. When the opening 14 is unobstructed, a large area of a patient's body may be photographed or treated, but when flow of rays forwardly from the block or plate 9 is ob-

structed, only reduced portions thereof will strike the patient.

Control of the rays is accomplished by means of shutters 15 formed of lead plates pivotally mounted by hinges 16 for vertical swinging movement in order to effect adjusted positions. Various mechanisms may be employed for swinging the shutters to adjusted positions and supporting them when so adjusted but, in the form illustrated, the adjusting means consists of lines 17 secured to free ends of the shutters out of the path of the rays and extending upwardly and about pulleys 18 carried by an overhead support. These pulleys have been shown mounted at the front of a headboard 19 which projects forwardly from the support 12 and is secured upon upper ends of supporting members 20 carried by the support 12, but it is to be understood that any desired overhead support may be provided for the pulleys. Brackets 21 are mounted on the headboard and carry shafts 22 and 23 upon which are mounted drums 24 and 25. Bearings for the shafts could be mounted upon the support 12, if desired. The lines 17 are wound upon the drums, and it will be readily understood that when the drums are turned to wind one line upon its drum and unwind the other line, the shutters will be moved toward open position or toward closed position, according to the direction in which the drums are turned. The drums may be independently operated if desired, and, also, the lines may be hand operated and secured to cleats or the like, instead of being wound upon drums.

When the shutters are in the position shown by full lines in Fig. 2, the cone of rays will be unobstructed, as indicated by the arrows C, and a large portion of the patient's body will be flooded by the Roentgen rays. When the shutters are in the dot and dash line position shown at 15a, the rays are blocked to form a cone of the dimensions indicated by the arrows B, and a smaller area of the patient's body will be flooded, and when the shutters are in the dotted line position shown at 15b, the cone will be further restricted, as indicated by the arrows A, and a still smaller portion of the patient's body will be exposed to the rays. It will be understood that these merely indicate three positions in which the shutters may be supported and that they may be supported at any angle between fully open position and fully closed position, in which latter position they completely block forward flow of the cone of Roentgen rays. Any suitable means may be provided for releasably holding the drums stationary after the shutters have been moved to the desired adjusted positions.

In Figs. 4 through 7, there has been illustrated a modified construction wherein the lead shutters 26 are mounted for swinging movement in a horizontal plane by hinges 27. These hinges are secured to the lead block 9 and outer side edge portions of the shutters and are thus mounted for swinging movement from the closed position shown in Fig. 6, toward the fully open position shown in Fig. 7, or the partially open positions such as indicated at 26a and 26b by dot and dash lines in Fig. 7. There have been shown lines 28 secured to pins 29 at upper ends of the shutters for moving the shutters to adjusted position but it is to be understood that other means may be provided for adjusting the shutters.

In Figs. 8 through 11, there has been illustrated another modified form of shield. In this embodiment, there has been shown a frame having up-

right tracks 30 and transversely extending horizontal tracks 31 which are secured against front faces of the tracks 30 in cross relation thereto. The tracks are preferably of channel metal but other suitable material may be used. Lower ends of the tracks 30 carry supporting feet 32 and their upper ends are secured to brackets 33 at the front end of the headboard 34 which extends horizontally and is supported at its rear upon one or more uprights 35. Lead shutters 36 and 37 are slidably mounted in the tracks 30 and 31 and, in order that the shutters 36 may be shifted vertically to adjusted positions, there have been provided lines 38 trained about pulleys 39 carried by brackets 40 mounted at the front end of the headboard 34. These lines have their lower ends connected with the shutters and their rear end portions may be wound upon drums or connected with other suitable mechanism for actuating the lines and raising or lowering the shutters when opening or closing thereof is desired. The horizontal shutters 37 have handholds 39 for manual opening and closing thereof, and similar handholds 40 are carried by the shutters 36 so that they may be manually opened and closed, one of the lines 38 being secured to the handhold of the lower shutter 36. By the provision of vertical as well as horizontal shutters, a greater degree of size control of the cone of Roentgen rays is permitted as the shutters 36 move vertically and the shutters 37 move horizontally across the vertical shutters and the size of the opening through which the Roentgen rays may pass can be adjusted for both height and width.

The shutters of the device shown in Figs. 1 through 7 of the drawings, are located close to the tube, preferably within six inches of the tube, but the device shown in Figs. 8 through 11, may be located any distance desired between the tube and the film to be exposed.

Instead of having the patient stand while being photographed or treated, it is often desirable to have the patient lie prone. Therefore, the tracks 30 or side bars of the frame are provided with legs 41 projecting from their rear surfaces in spaced relation to their ends. In order that the shield may be used in a horizontal position, it is merely necessary to detach upper ends of these tracks from the brackets 33 and detach the lines 38 from shutters 36, and the shield may then be supported horizontally with the feet 41 resting upon a floor or platform, as shown in Fig. 11. If desired, the shutters may be formed as shown in Fig. 12, and, referring to this figure, it will be seen that the shutter 42 is formed with a centrally located opening 43.

Having thus described the invention, what is claimed is:

1. An X-ray shield comprising a base for supporting an X-ray machine, a top spaced upwardly from said base in a substantially horizontal plane, a shield formed of material impervious to Roentgen rays, said shield being disposed in a vertical plane between forward portions of the base and top and formed with an opening for passage of a cone of Roentgen rays forwardly through the shield toward a subject, upper and lower mounting members carried by the top and base and engaging upper and lower portions of said shield to support the shield in vertical position, hinges carried by said mounting members in front of said shield, shutters carried by said hinges and thereby mounted for vertical swinging movement toward and away from said shield into and out of position across the opening in

closing relation thereto, said shutters when closed having their free edges meeting intermediate upper and lower edges of the opening, and means for independently effecting opening and closing movement of the shutters and maintaining the shutters in adjusted positions.

2. An X-ray shield comprising a base for supporting an X-ray machine, a top spaced upwardly from said base, a shield formed of material impervious to Roentgen rays, said shield being disposed in a vertical plane between forward portions of the base and the top and formed with an opening for passage of a cone of Roentgen rays forwardly through the shield toward a subject, upper and lower mounting members carried by the top and base and engaging upper and lower portions of said shield to support the shield in vertical position, shutters in front of said shield hingedly mounted in cooperating relation to said shield for swinging toward and away from said shield into and out of closing relation to the opening and when closed having their free ends meeting across the center of the opening, and means for independently swinging said shutters away from said shield to open position and supporting the shutters when opened.

3. An X-ray shield comprising a base for sup-

porting an X-ray machine, a top spaced upwardly from said base in a substantially horizontal plane, a shield formed of material impervious to Roentgen rays, said shield being disposed in a vertical plane between forward portions of the base and the top and formed with an opening for passage of a cone of Roentgen rays forwardly through the shield toward a subject, upper and lower mounting members carried by the top and base and engaging upper and lower portions of said shield to support the shield in vertical position, shutters in front of said shield disposed above and below the opening and hinged to said mounting members for swinging vertically toward and away from said shield into and out of closing relation to the opening and when closed having their free ends meeting midway the depth of the opening, a mounting over said top projecting forwardly therefrom, guides at the front of said mounting, drums rotatably mounted over said mounting, and cables wound upon said drums and extending forwardly and engaged with said guides and downwardly therefrom and secured to free ends of said shutters to support the shutters in adjusted positions.

GEORGE G. WASISCO.