A. C. SOULE.

WINDOW.

APPLICATION FILED NOV. 4, 1913.

1,155,014.

Patented Sept. 28, 1915.

3 SHEETS—SHEET 1.

Fig. 1.

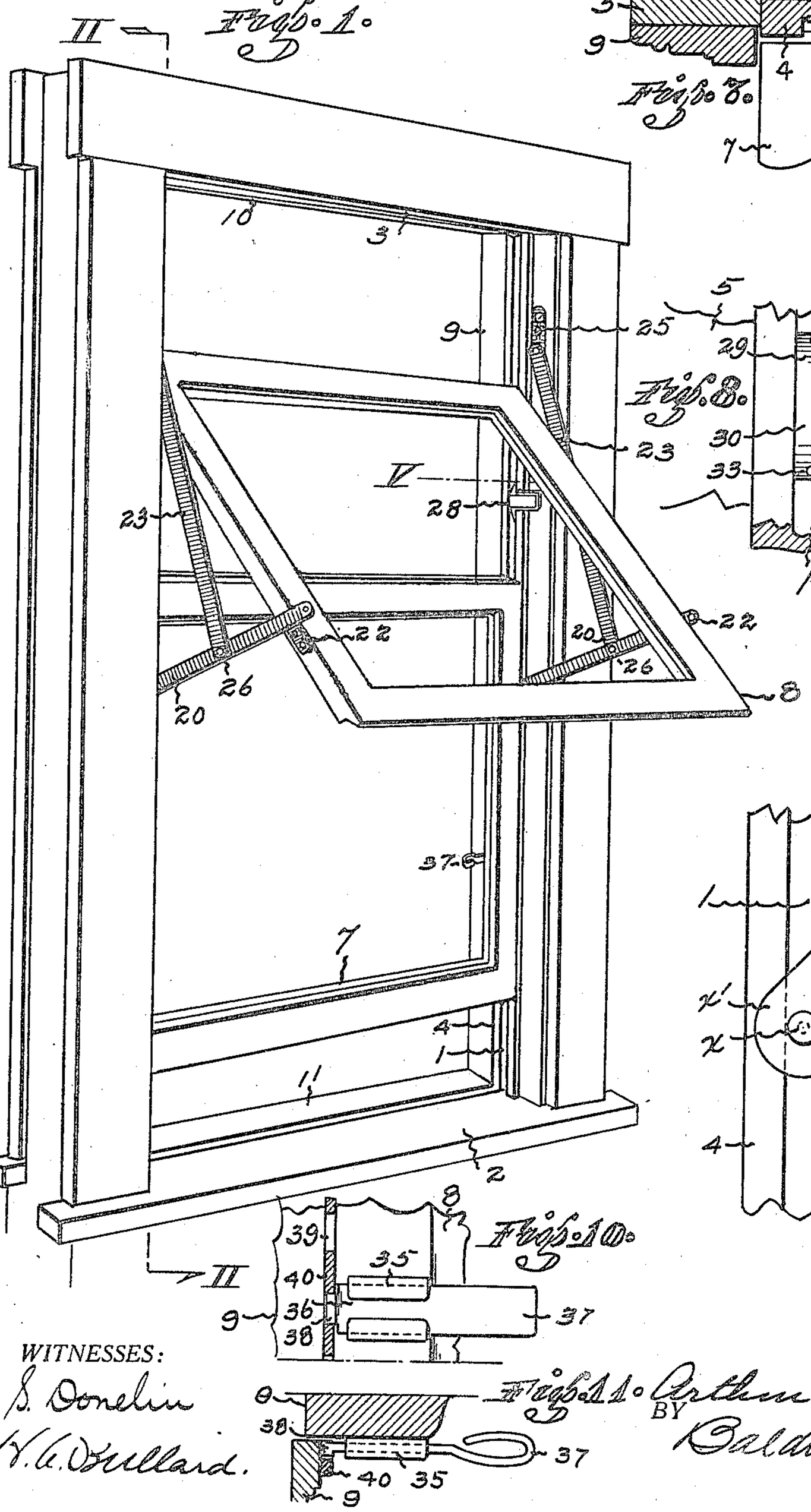


Fig. 7.

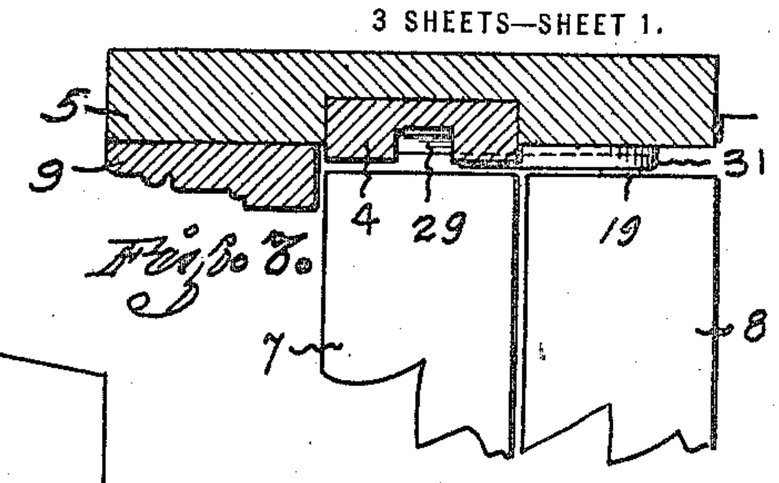


Fig. 8.

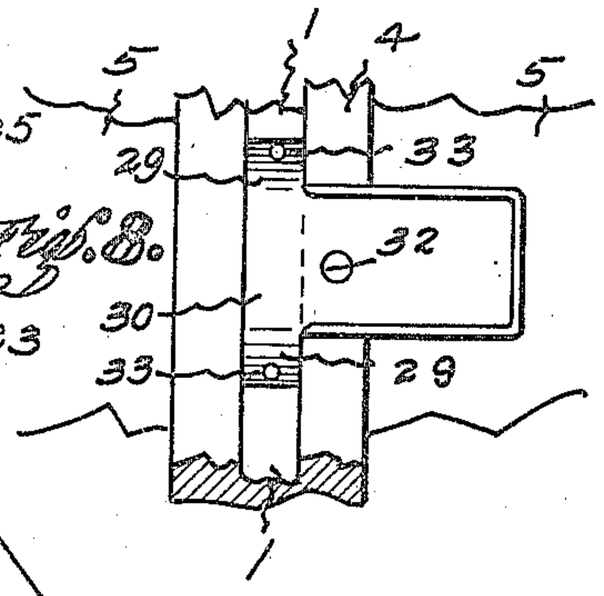


Fig. 9.

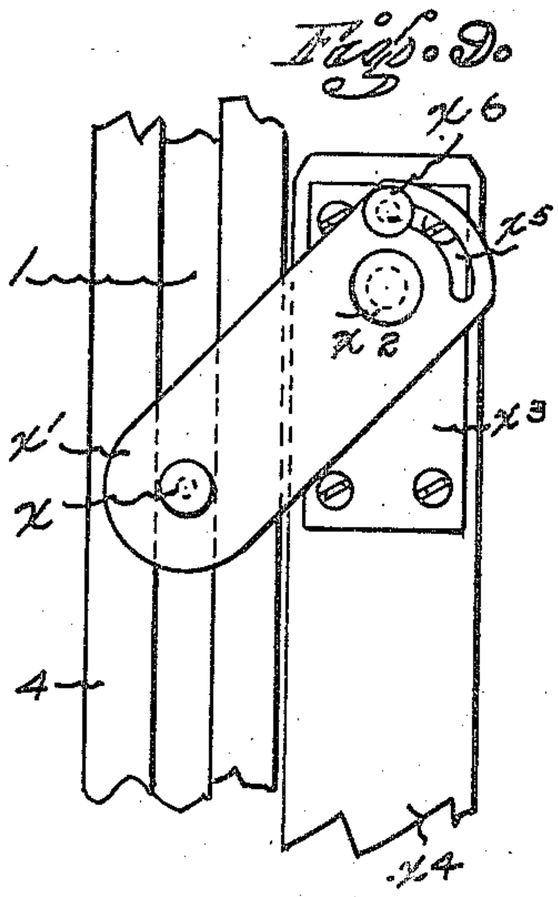
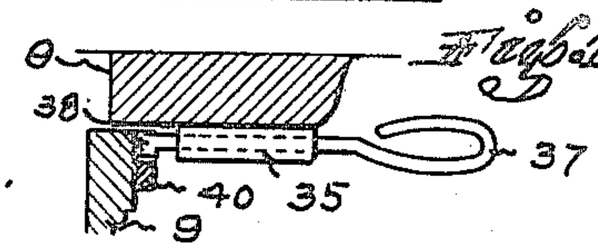


Fig. 10.

Fig. 11.



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3 SHEETS—SHEET 2.

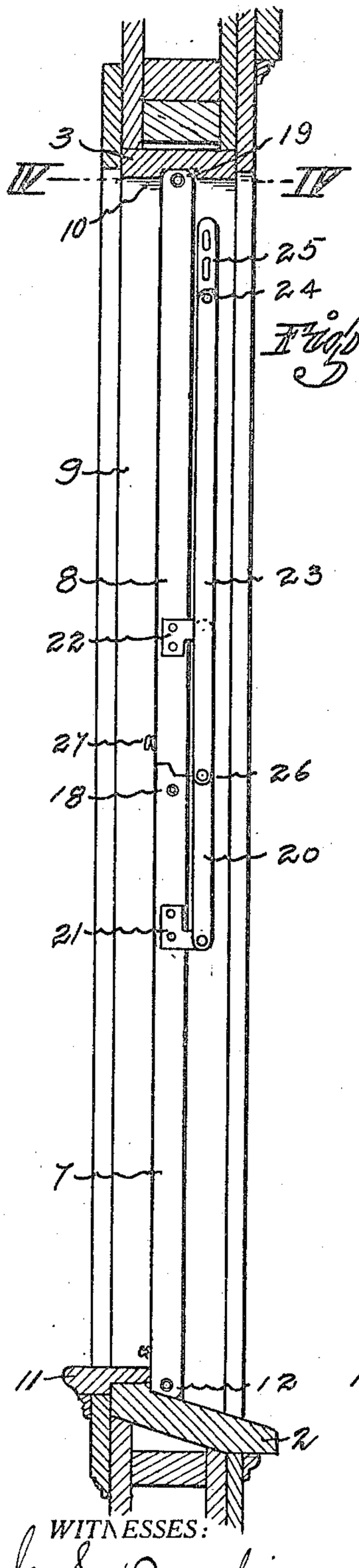

Fig. 2.

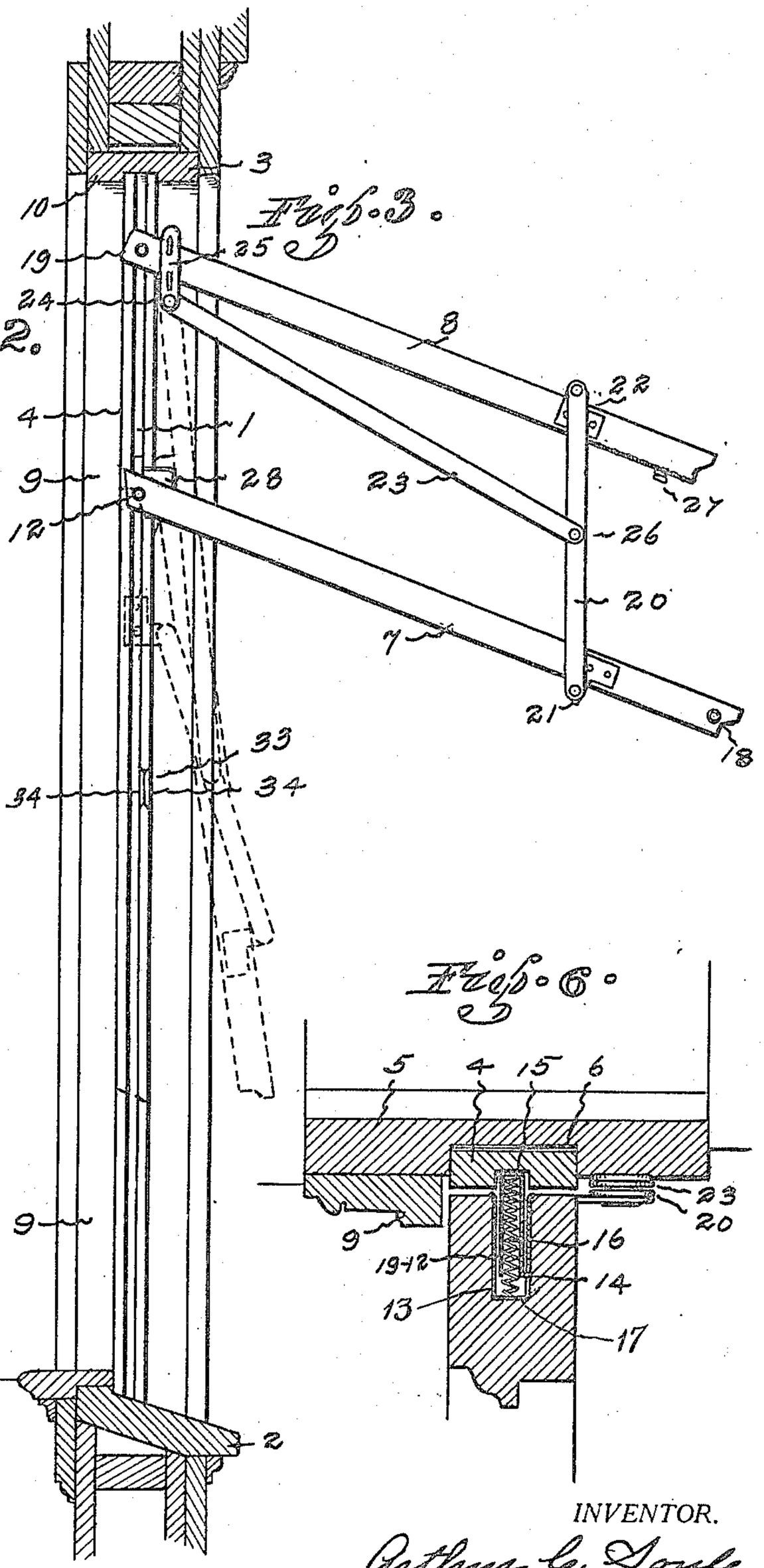

Fig. 3.

Fig. 6.

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3 SHEETS—SHEET 3.

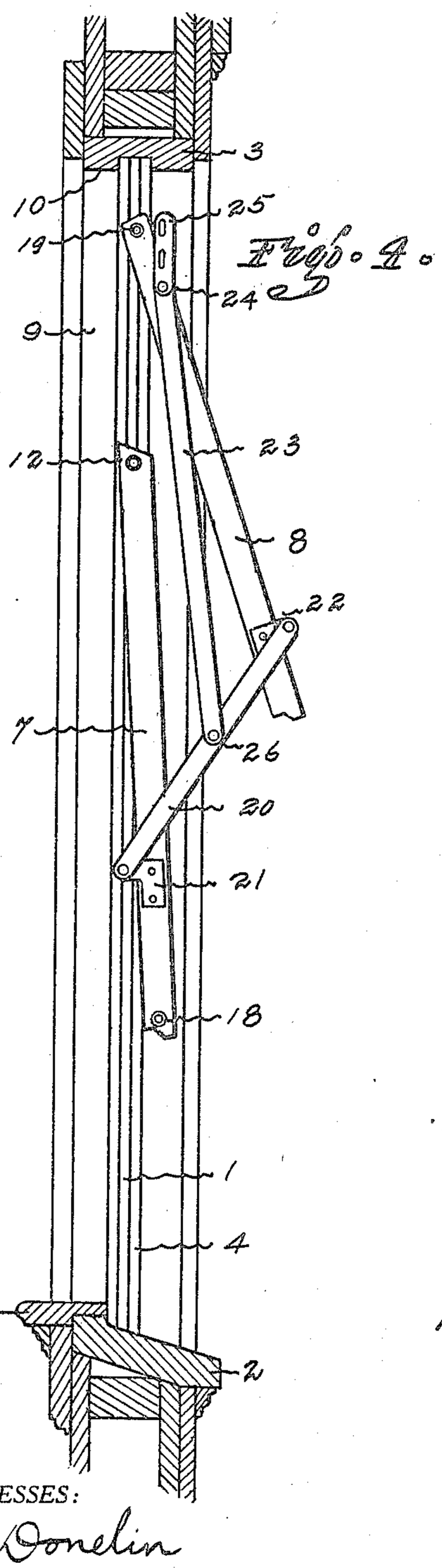

Fig. 4.

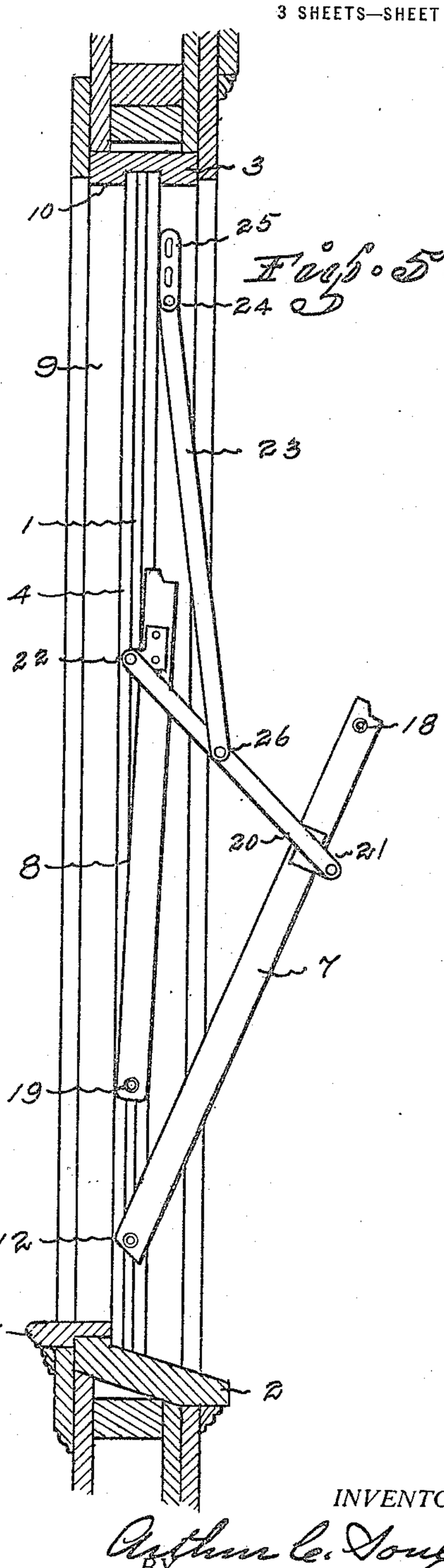

Fig. 5.

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UNITED STATES PATENT OFFICE.

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WINDOW.

1,155,014. Specification of Letters Patent. Patented Sept. 28, 1915.

Application filed November 4, 1913. Serial No. 799,249.

To all whom it may concern:

Be it known that I, ARTHUR C. SOULE, a citizen of the United States, and residing at 226 Judah street, in the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Windows; and I do hereby declare the following to be a full, clear, and exact description of the said invention, such as will enable others skilled in the art to which it most clearly appertains to make, use, and practise the same.

This invention relates more particularly to windows in which the two sashes are so connected that they counterbalance the weight of each other.

Among the objects of this invention are, to eliminate cords, pulleys and other counterbalancing mechanisms from windows; to so connect the two sashes of the window that they will counterbalance the weight of each other; to retain the desirable features of the sliding sash window, and add the advantages of reversible sashes, and a variety of sash positions possible only in pivoted sashes.

Other objects and advantages will appear as the description progresses.

In the drawing accompanying and forming part of the present specification, to which like reference characters have been applied a simple form of putting this invention into practice is shown.

I do not wish to be understood as confining this invention to the disclosures made in said drawing and description, as many variations may be introduced, within the spirit of this invention as defined in the claims succeeding the said description.

In the drawings; Figure 1. is a front elevation in perspective from the outside of a window constructed in accordance with this invention with the upper sash in an inclined position. Fig. 2. is a side elevation of the same, with the side of the frame removed on the line II—II to disclose the sashes in the closed position. Fig. 3. is a similar view of the same with both sashes in the full open position. The positions assumed by the sashes when registering in the open position is indicated in dotted lines in this figure. Fig. 4. is a view similar to Fig. 2. illustrating the positions assumed by the sashes, when the lower sash is reversed. Fig. 5. is a similar view, with the upper sash reversed. Fig. 6. is a fragmentary detail view in cross section of the corner of the upper sash and the adjacent frame work, looking down at the level designated IV—IV, disclosing the spring pivot, and the relation of the connecting and swing arms to the sash and the frame. Fig. 7. is a similar view taken on the line V—, Fig. 1, illustrating the application and form of the switch plate. Fig. 8. is a front elevation of the switch plate as applied to the guiding slot. Fig. 9 is a front elevation fragmentary detail of a substitute for the switch plate and spring pivot for the top sash. Fig. 10. is a fragmentary detail in front elevation of the sash lock as applied to the sash stile, and engaging a notched plate secured to the jamb stop. Fig. 11. is a plan view from above of the same.

In detail the construction illustrated in the drawings consists of a conventional window frame, that will vary with architectural conditions, and will be understood to include everything except the sashes, sash guides and other minor elements intimately combined with the sashes, in their combinative relation to the frame.

The window frame is provided with the grooves 1, 1 on both sides, extending from the sill 2, to the top plate 3. These slots are preferably formed in an inserted molding 4 of hard wood, metal or other suitable material, gained into the side jambs 5—5 of the window casing. This molding is preferred to slots grooved directly into the jambs; and further, the molding may be shimmed out to make up for any excess play between the window casing and the sashes, by inserting the shims 6. For appearance the moldings are preferably the same width as the sashes are thick.

The sashes 7 and 8 are the usual rectangular, glazed frames, adapted when superimposed in the window casing to completely close the window opening. The necessary space between the sashes and the casing is sealed by the jamb stops 9—9 and 10 at the top and sides, alined with the stool 11, against which the sashes bear in the closed position, and from which they are adapted to swing outward in opening.

The lower sash 7 is provided with the laterally extended spring pivots, 12—12 pref-

erably located as near the lower corners as practicable. These pivots include the shell 13 fixed in the sash stiles, and adapted to guides the tubular pivots 12 having the in-turned or closed head 15, and telescoping freely within the shell. The coil spring 16, expands between the head 15 and the in-turned flanges 17, to normally hold the pivot in the extended position. The heads of the pivots extend into engagement with the grooves or slots 1, 1 within which they move freely up and down with the sash and exert a slight frictional pressure against the bottoms of the grooves for reasons that will be disclosed later.

To prevent the top of the lower sash falling outward it is provided with the spring bolts 18—18, similar in construction and similarly applied as described in connection with the spring pivots 12—12, a shoulder 14 engaging a slot in the shell being provided to limit the extension of the pivot or the bolt as the case may be.

The upper sash 8 is similar to the sash 7, and is provided as near the two upper corners as practicable with the spring pivots 19—19, similar to the pivots 12—12, and similarly engaging the grooves 1, 1. Thus constructed and installed either the upper or lower sash may be raised or lowered vertically, guided by its engagement with the grooves if the other sash is swung out of its path.

The two sashes are connected together by the connecting arms 20—20, having each of their ends pivoted at points approximately one quarter of the length of the sashes from the adjacent ends thereof. To permit the connecting arms to lie outside of the plane of the sashes, the extension brackets 21—21, and 22—22 are provided, to which the ends of the connecting arms are pivoted. The brackets 21—21 are gained into the stiles of the lower sash, at a point approximately one quarter of the distance from the top of the sash to the bottom thereof. The brackets 22—22 are gained into the stiles of the upper sash, at a point approximately one quarter of the distance from the bottom of the sash to the top thereof. The pivot centers on the extensions on these two sets of brackets extend beyond the outer plane of the sashes and aline vertically; whereby the connecting arms lie parallel with the plane of the two sashes, when in the closed position; this is the preferred arrangement, but it is not arbitrary, as it may be varied without departing from the spirit of this invention.

To support the weight of the connected sashes and permit their various evolutions, the swinging arms 23—23 are provided on each side of the casing. The upper ends of these arms are pivoted at 24—24 to the adjustable plates 25—25 attached to the side jambs of the casing, near the top of the window, preferably in line with the alined extension bracket pivots, in the closed position. It is obvious that the pivots 24—24 may also be located near the bottom of the window, to uphold the weight, but the suspension system shown is preferred for many obvious reasons. The lower ends of these swinging arms 23—23 are pivoted at 26—26, to the connecting arms preferably near the center thereof between the two end pivots where they join the extension brackets 21—21 and 22—22. The lower sash reverses more freely if the distance between the pivots 26—26 and 21—21 is slightly greater than that between the pivots 26—26 and 22—22, about one half an inch greater in actual practice. The exact locations of the pivots 24 of the upper ends of the swing arms are determined when the sashes are in the closed position, then the adjustable plates 25—25 can be fixed permanently to the jambs, until further adjustment may be found necessary owing to distortion of the window frame or other causes. It is desirable to have the swinging arms 23—23 as long as practicable, better to support the sashes in such extreme positions as in Fig. 3, and to give a more favorable leverage in the manipulating of the sashes.

The invention operates substantially as follows: To place the upper sash in the position shown in Fig. 1, grasp the handle 27 and push the lower edge of the sash outward; this causes the upper edge of the sash confined by the engagement of the pivots 19—19 with the grooves to slide downward in the plane of the grooves. The lower sash being connected by the arms 20—20, and fulcrumed on the pivots 26—26, of the swinging arms 23—23 is caused to rise simultaneously in ratio with the movement of the top sash. The weight of the upper and lower sashes being approximately equal on both sides of the fulcrum mentioned, their respective weights are counterbalanced and either or both sashes will maintain the position into which they are forced by the operator.

The lower sash having its upper edge confined in the grooves by the spring bolts 18—18, and its lower edge similarly confined by the engagement of the spring pivots 12—12 with the same grooves, is forced to rise and fall in a line parallel with the plane of the grooves. To permit the two sashes to lie face to back as shown in dotted lines in Fig. 3, it is necessary to provide means for removing the upper sash from the path of the lower sash, so that the upper edge of the lower sash may pass the upper edge of the upper sash, or rise to its level, as the case may be.

To accomplish the "face to back" position of the two sashes as just described, and to permit the complete reversal of both sashes

within the casing, without at any period in their evolutions projecting inward beyond the stops 9—9 and 10 and the stool 11, the switch plates 28—28 are provided as one desirable means. These plates comprise preferably, a single piece of sheet metal with the lateral extensions 29—29 on opposite sides, adapted to be inserted into the grooves 1—1, from the bottom of which they incline upwardly to the plane 30 of the plate that is surrounded on three sides by the upturned flange 31. These plates are secured in position by the screw 32 engaging the molding 4, and the nails 33—33 securing the edges of the extensions 29 to the bottoms of the grooves.

Just above the point where the lower sash going up, would meet the upper sash coming down, the switch plates are inserted. The spring pivots 19—19 descending in the grooves strike the inclined extensions 29—29 up which they ride to the plane 30 of the plates, which clears the pivots from the grooves and permits them to travel laterally within the confines of the flange 31, removing the upper sash laterally from the path of the lower sash, which may be raised until stopped by the length of the connecting rod attached to the now vertical swinging arms 23—23, causing the sashes to assume the "face to back" position shown.

The same result may be accomplished by substituting a pivot X on the link X^1, pivoted at X^2, on the plate X^3, gained in the sash stile X^4, as shown in Fig. 9, the slot X^5, engaging the stop pin X^6, to limit the swing of the link X^1, or in any other suitable manner.

It is obvious, since both sashes are similarly secured within the window frame, and counterbalanced by attachment to each other at relatively equal points, that it is possible to cause the lower sash to follow the same evolutions that the upper sash is capable of, if the top edge of the lower sash is freed from engagement with the grooves by the spring bolts 18—18. To so free the spring bolts from the grooves, the molding 4 is cut away on both sides of the casing. Instead of making a gap it is preferable to notch the molding on both edges to form the incline planes 34—34, up which the bolts 18 will be caused to ride until they are depressed in to the sash stile sufficiently to permit their engagement or disengagement with the grooves, for the purpose intended. This same result may be accomplished by substituting spring plungers for the spring bolts 18—18, that will project through the sash stile, for the withdrawal of the plungers from engagement with the grooves.

To reverse the lower sash, that is, to present the outside of the sash to the inside of the room, for washing, or other purposes; place about as shown in Fig. 1, release the spring bolts 18—18, then lift the lower edge of the lower sash until it is completely reversed, it will then have assumed the location within the window opening shown in Fig. 4. To reverse the upper sash, follow the same procedure except that the upper edge of the upper sash is pulled downward, until its outer surface is presented within the room. See Fig. 5.

It is needless to explain that the other sash describes correlative evolutions during the reversal of either sash, all of which are rendered sufficiently obvious, by consulting the drawings. The sashes are restored to their normal positions by reversing the various actions described. One particularly desirable feature of this invention is the very convenient position, near the center of the window opening, that the sashes assume in the reversed position, facilitating washing, etc.

Because of the perfect counterbalancing of the sashes, and the novel arrangement of the leverage of the connecting and supporting arms, the upper sash can be made to assume any desired position by forcing the lower sash into the proper correlative position, and vice versa, that is to say, by raising the lower sash, the upper sash can be forced into the position shown in Fig. 1, or most of the various desired positions. These several positions are maintained even against strong wind resistance, vibration, or the like, because of the perfect balance of the sashes, assisted by the very slight friction exerted by the various spring pivots and bolts, frictionally pressing against the bottoms of the grooves that they engage.

Because of the combinative interdependence of the upper and lower sashes, locking either will lock both; therefore it is preferable to apply the locking means to the lower sash, because of its accessibility. One desirable form of lock is shown, selected from the many forms available for the purpose. This form of lock includes the guide 35 screwed to the sash stile contiguous to the jamb stop. The slide bolt 36, provided with a conveniently shaped handle 37, is slidably guided in the guide 35. This bolt has a head 38 adapted to engage the notches 39, in the plate 40 screwed to the jamb stop. To prevent the complete withdrawal of the bolt the end of the head 38 is bent upward to stop against the end of the guide, when the bolt is withdrawn, from the notches 39.

Having thus fully described this invention what I claim and desire to secure by Letters Patent is:

1. A window including a frame, two sashes operative in said frame, connecting arms pivoted to both of said sashes, and swing arms pivoted to said connecting arms and the window frame.

2. A window including a frame, sashes op-

erative in said frame, connecting arms pivoted to both of said sashes, a fulcrum pivot for said arms attached to said frame and having a prescribed movement outward from said frame.

3. A window including a frame, grooves in said frame, two sashes operative in said frame, pivots on said sashes engaging said grooves, connecting arms pivoted to both of said sashes, and swing arms pivoted to said frame and to said connecting arms.

4. A window including a frame, upper and lower sashes pivotally and slidably engaging said frame, connecting arms pivoted to both of said sashes, and swing arms pivoted to said connecting arms, and the said frame.

5. A window including a frame, grooves in said frame; a lower sash having pivots near the bottom engaging said grooves; an upper sash having pivots near the top engaging said grooves; connecting arms having one end pivoted above the center of the lower sash, and the opposite end pivoted below the center of the upper sash, and swing arms pivoted near the top of said frame, and near the center of said connecting arms.

6. A window including a frame, grooves in said frame; a lower sash having pivots near the bottom engaging said grooves; an upper sash having pivots near the top engaging said grooves; connecting arms having one end pivoted above the center of the lower sash, and the opposite end pivoted below the center of the upper sash; swing arms pivoted near the top of said frame, and near the center of said connecting arms; and means for switching said upper sash out of the path of the lower sash.

7. A window including a frame, grooves in said frame; upper and lower sashes, pivots on said sashes, engaging said grooves; connecting arms pivoted to both of said sashes; swing arms pivoted to said connecting arms and said frame; and switch plates fixed to said frame for the purpose specified.

8. A window including a frame, grooves on opposite sides of said frame; upper and lower sashes; pivots on said sashes slidable in said grooves; connecting arms pivoted on both of said sashes, and fulcrumed on a pivot movable outward from the plane of said grooves; whereby both of said sashes may be reversed in the said frame.

9. A window including a frame, grooves on opposite sides of said frame; upper and lower sashes disposed in the same plane within said frame, in the closed position; pivots on said sashes, engaging said grooves; connecting arms pivoted to said sashes; swinging fulcrums attached to said frame and engaging said connecting arms so that said sashes counterbalance the weight of each other in their various evolutions.

10. A window including a frame, grooves on opposite sides of said frame; upper and lower sashes disposed in the same plane within said frame, in the closed position; resilient pivots on said sashes slidable in said grooves; means for switching one sash laterally to the plane of the other in the open position; connecting means for counterbalancing the said sashes in the said frame; and means for reversing said sashes within said frame.

11. A window including a frame, upper and lower sashes slidably pivoted in said frame; connecting arms connecting said sashes together; swinging fulcrums for said arms pivoted to said frame; and means for locking said sashes in the desired position.

12. A window including a frame, grooves on opposite sides of said frame; a lower sash having resilient pivots near the lower corners thereof, and spring bolts near the upper corners thereof, both engaging said grooves; an upper sash having resilient pivots near the upper corners thereof; connecting arms having one end pivoted above the center of the lower sash, and the opposite end pivoted below the center of the upper sash; swing arms pivoted near the center of the connecting arms, and also pivoted on the said frame; a locking bolt on one of said sashes adapted to engage a notch on said frame, and a switch plate adapted to release the pivots of the upper sash from engagement with said grooves without detaching said sash from engagement with said frame.

In testimony whereof, I have hereunto set my hand this 30th day of October 1913.

ARTHUR C. SOULE.

Witnesses:
BALDWIN VALE,
H. A. BULLARD.