Jan. 6, 1931. A. A. POTTER 1,787,917

CASEMENT

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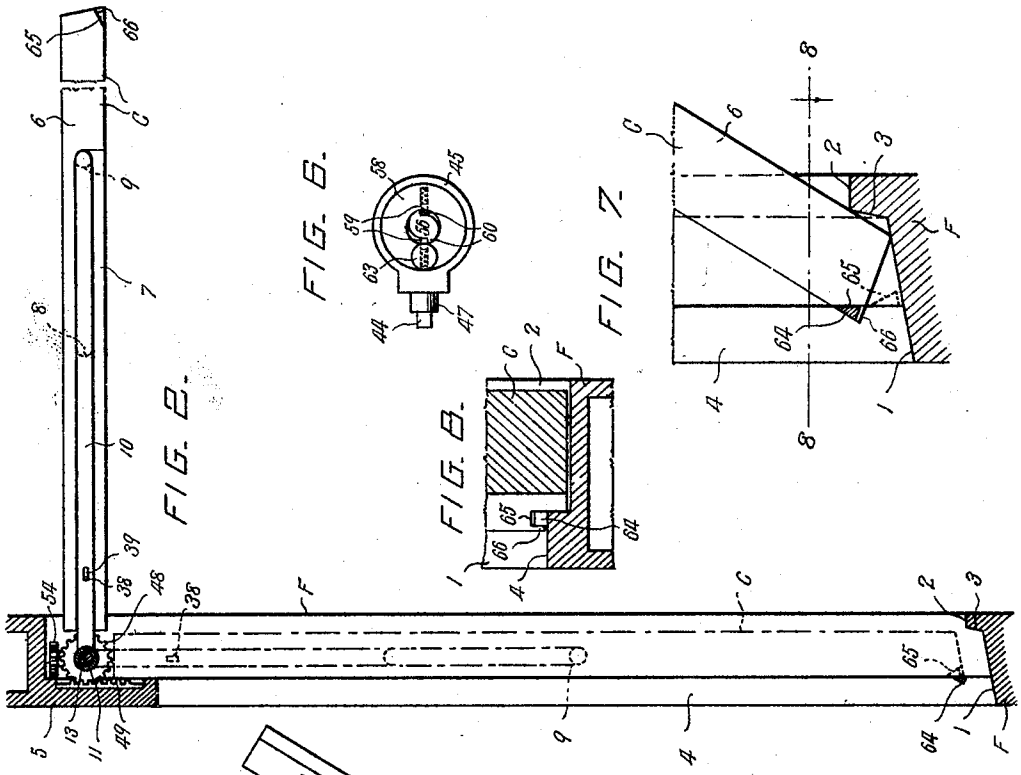


FIG. 2.

FIG. 6.

FIG. 8.

FIG. 7.

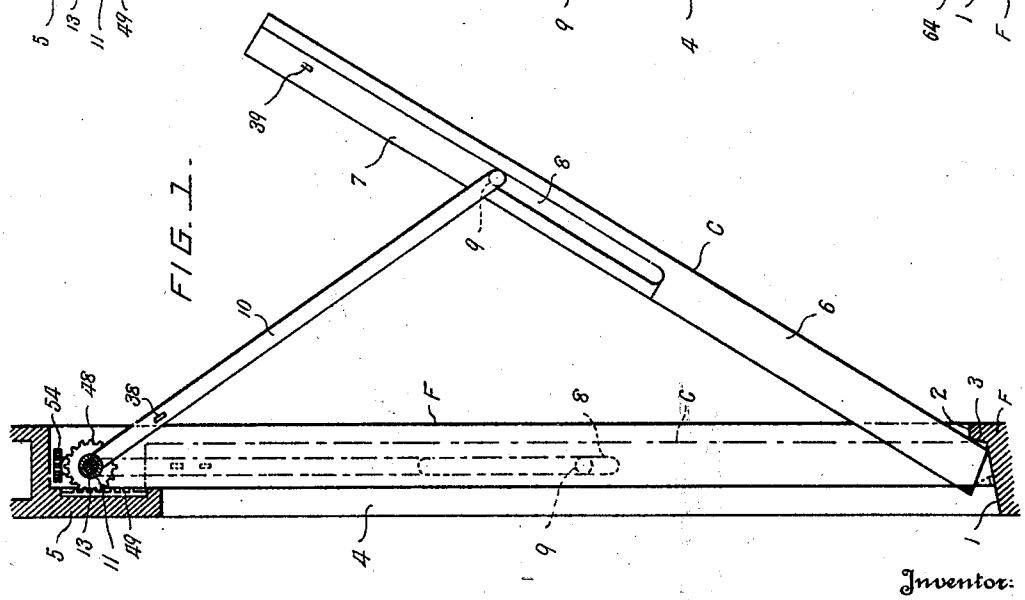


FIG. 1.

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FIG. 3.

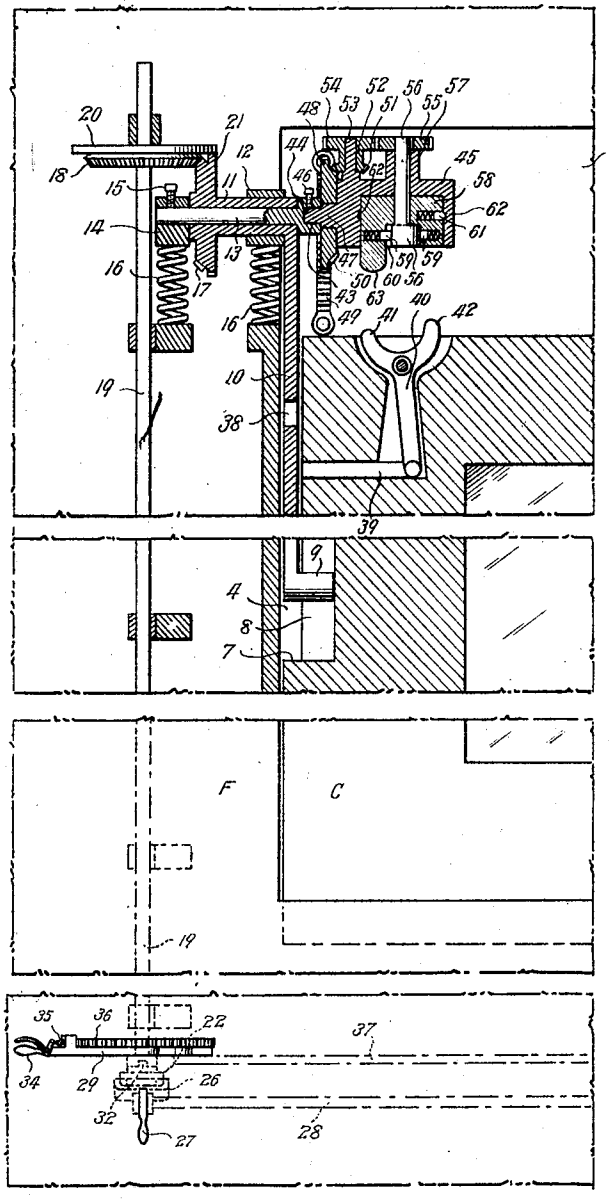


FIG. 4.

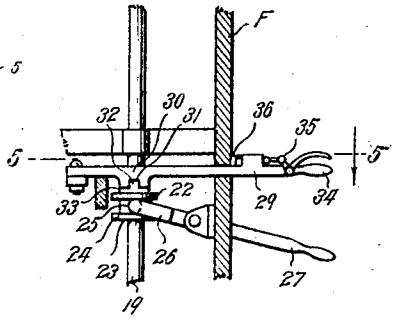


FIG. 5.

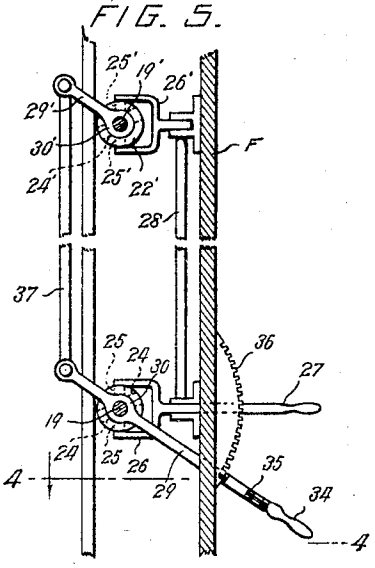


FIG. 10.

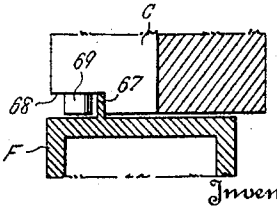
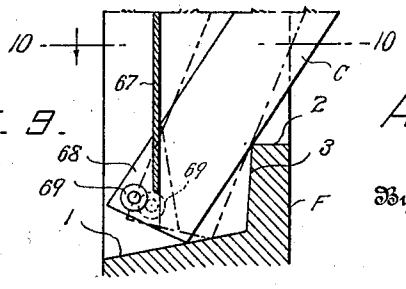


FIG. 9.



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FIG. 11.

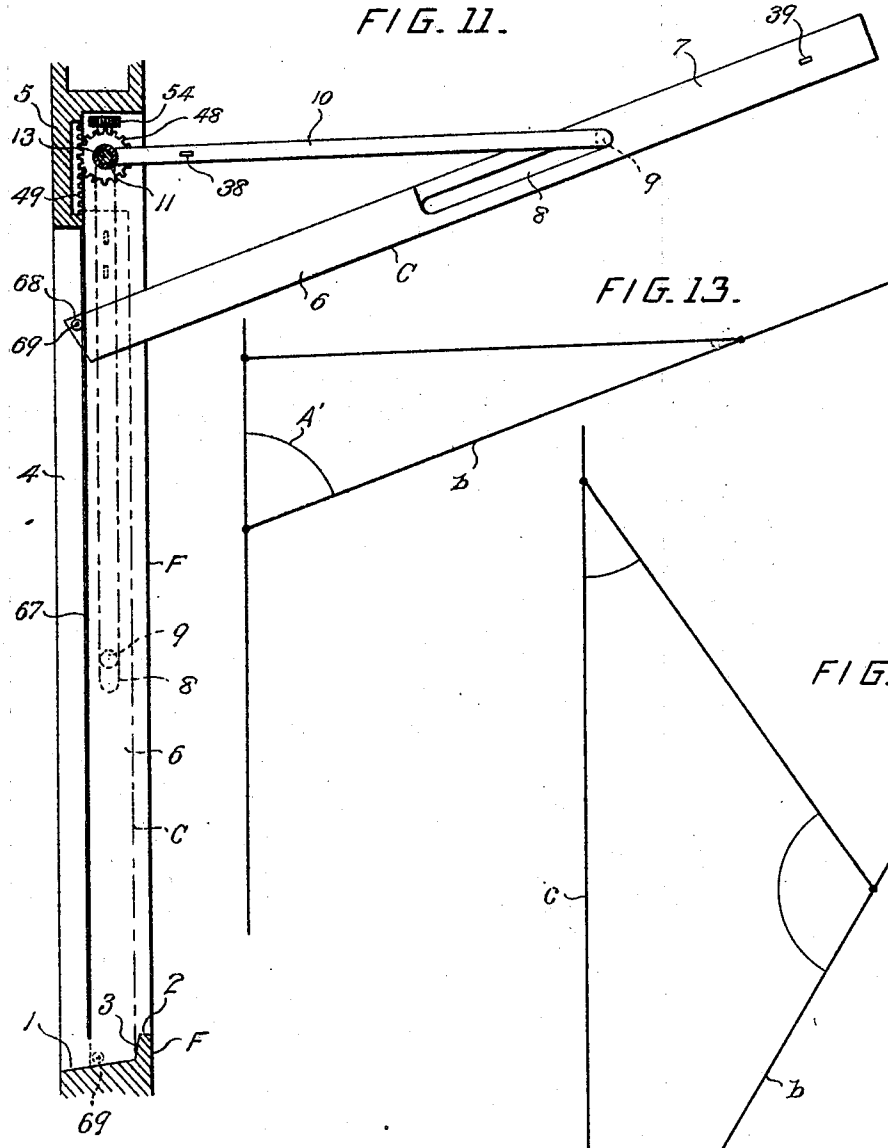
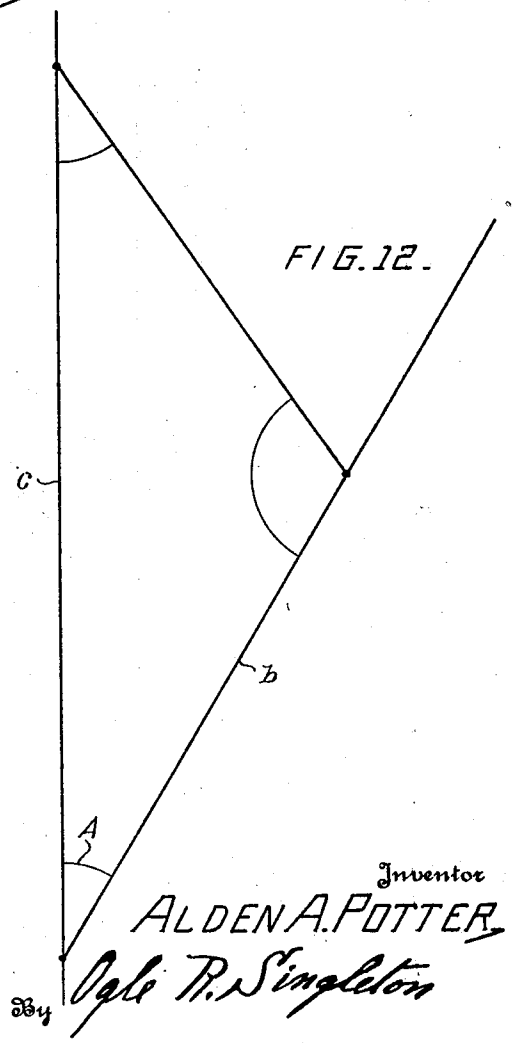


FIG. 13.

FIG. 12.



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Patented Jan. 6, 1931 1,787,917

UNITED STATES PATENT OFFICE

ALDEN A. POTTER, OF THE COUNTY OF MONTGOMERY, MARYLAND

CASEMENT

Application filed October 8, 1927. Serial No. 224,845.

My invention consists in a new and useful improvement in casements and constitutes a development of an improved form of the casement described and claimed in my application for United States Letters Patent, Serial Number 221,953, filed in the United States Patent Office on September 26th, 1927. My present invention provides a casement which may be made to assume the positions of the casement of the above mentioned application, its operation being mechanically performed. I have conceived the idea that the casement described and claimed in my prior application is adapted for use where large and heavy casements, unsuited for manual operation, are desired, and also where the casement is inaccessible for manual operation, and I have, therefore, perfected the invention herein described and claimed to produce a mechanically operated casement which can be pivoted at both its lower and upper edges. The particularly novel feature of my latest invention is the means which I provide for alternatively tipping and swinging the casement, and means for altering said operating means from a limiting means when tipping to a hinge means when swinging the casement. The particularly useful feature of this device is the provision of only two operating levers by which the manipulation of the casement may be accomplished.

The means which I employ may be so modified, within the scope of my invention, as to become applicable to a plurality of casements, and is therefore adapted for use with a large number of casements, as in auditoriums, theaters, factories, etc., the particular advantage secured in such installation being simplicity and reliability of operation.

While I have illustrated in the drawings filed herewith and have hereinafter fully described one specific embodiment of my invention, it is to be distinctly understood that I do not consider my invention limited to said embodiment, but refer for its scope to the claims appended hereto.

In the drawings:

Fig. 1 is a vertical section, the parts in full lines being shown in one adjusted open position, and, in dotted lines in normal closed position.

Fig. 2 is a vertical section, the parts in full lines being shown in another adjusted open position, and, in dotted lines in adjusted closed position.

Fig. 3 is an elevation, partly in section, of one side of the casement and frame.

Fig. 4 is a vertical section on the line 4—4 of Fig. 5.

Fig. 5 is a horizontal section on the line 5—5 of Fig. 4.

Fig. 6 is a detail bottom view of a portion of the mechanism shown in vertical section in Fig. 3.

Fig. 7 is an enlarged detail vertical section of the lower portion of Fig. 1.

Fig. 8 is a horizontal section on the line 8—8 of Fig. 7.

Fig. 9 is a view similar to Fig. 7, showing a modification.

Fig. 10 is a horizontal section on line 10—10 of Fig. 9.

Fig. 11 is a vertical section, similar to Fig. 1, the parts in full line being shown in another adjusted open position, and, in dotted lines in normal closed position.

Fig. 12 is a diagrammatic view, the parts being in the position indicated in Fig. 1.

Fig. 13 is a diagrammatic view, the parts being in the position indicated in Fig. 11.

In the specific embodiment of my invention illustrated in the drawings, I have shown a casement C and frame F therefor. The frame F has a sill 1, stool 2 with beveled inner face 3, side stops 4, and apron 5 at its top. When the casement C is in normal closed position, as shown in dotted lines in Figs. 1 and 11, it rests upon the sill 1, outside of the stool 2 and inside of the stops 4 and apron

5. The side rails 6 of the casement C are suitably provided with rabbeted portions 7 in which are elongated slots 8 in which are received lugs 9 on operating arms 10 which fit into the rabbeted portions 7 when the casement C is closed. In illustrating the mechanism for actuating the operating arms 10, I have shown only the mechanism on one side of the casement, it being understood that it is duplicated upon the other side. As illustrated, the arm 10 is made integral with a revoluble sleeve 11 carried in a bearing 12 and mounted upon a rod 13 fixed in a block 14 by a pin 15, the bearing 12 and block 14 being mounted for vertical reciprocation upon compression springs 16 which are suitably mounted in the frame F. The sleeve 11 is provided upon its end away from the arm 10 with a pinion 17 meshing with a pinion 18 on a vertical rotatable shaft 19 suitably journaled in the frame F. The shaft 19 is provided with a disc 20 which bears upon a disc 21 on the sleeve 11. At its lower end the shaft 19 is provided with a clutch formed by the collars 22 and 23, the lower one 23 being provided with radial slots 24. For engagement with this clutch on the shaft 19, I provide pins 25 on a fork 26 on a lever 27 suitably pivoted in the frame F for vertical reciprocating movement. I provide a duplicate mechanism for reciprocating shaft 19′, comprising collars 22′ and 23′ with slots 24′, pins 25′ on a fork 26′ mounted on a rock shaft 28 attached to the lever 27.

From the foregoing description of the details of construction, it will be obvious that when the lever 27, as illustrated in Fig. 4, is raised, the shafts 19 and 19′ will be depressed, and the discs 20 bearing upon discs 21 will cause the sleeves 11 and their arms 10 to descend, the blocks 14 and bearings 12 being depressed against the action of the springs 16. When the pressure upon the lever 27 is removed the action of the springs 16 causes the parts to return to normal position.

I have provided a crank arm 29 having a collar 30 loosely encircling the shaft 19 and provided with radial slots 31 on its under side in which are received lugs 32 on a collar 33 fixed upon the shaft 19. The crank arm 29 projects through the inner face of the frame F and has a handle 34 with a spring latch 35 co-acting with a stop rack 36. The end of the crank arm 29 away from the handle 34 is connected by a link 37 with a crank arm 29′ having a collar 30′ about the shaft 19′ and provided with radial slots 31′ in which are received lugs 32′ on a collar 33′ fixed on the shaft 19′. Thus it will be seen that when the crank arm 29, as illustrated in Fig. 5, is rocked, the shafts 19 and 19′ are caused to rotate imparting movement through pinions 18 and 17 to sleeves 11 and arms 10.

It is to be noted that when the shafts 19 and 19′ are depressed by operation of the lever 27, the lugs 32 and 32′ are carried out of the slots 31 and 31′ in the collars 30 and 30′, with the result that the operating crank arm 29 is rendered inoperative to rotate the shafts 19 and 19′, thus preventing the shafts 19 and 19′ from being rotated except when the shafts 19 and 19′ and their associated mechanisms are in normal position. It is also to be noted that when the shafts 19 and 19′ are rotated from normal position by the operation of the crank arm 29, the slots 24 and 24′ in the collars 23 and 23′ are brought into register with the pins 25 and 25′ on the forks 26 and 26′, thus rendering the reciprocating mechanism inoperative except when the shafts 19 and 19′ and their associated mechanisms are in normal position.

The foregoing makes it obvious that the rotation and reciprocation of the shafts 19 and 19′ must be alternative and cannot be synchronous.

Each operating arm 10 is provided with a suitably disposed slot 38 and the casement C is provided with mortised bolts 39 so disposed as to be received in said slots 38 when projected from the casement C. For moving each bolt 39, I provide a rocker arm 40 pivotally mounted in the casement C and having a forked head with the fingers 41 and 42.

I will now describe the mechanism which I provide for operating the bolts 39, it being understood that while only one of these mechanisms is illustrated in Fig. 3, I provide duplicate mechanisms, one on each side of the casement C.

In order to mount this mechanism, I provide the end of each rod 13 with a socket 43 in which is received a tongue 44 on a block 45. The tongue 44 is held in the socket 43 by a pin 46. Adjacent the tongue 44, the block 45 is so shaped as to form a bearing 47 on which is carried a pinion 48 meshing with a vertically disposed rack 49 mounted on the apron 5. Formed integral with the pinion 48 is the gear 50 with which meshes the gear 51 on the sleeve 52 carried on the post 53 of the block 45. The sleeve 52 has on its top the gear 54 meshing with the gear 55 on the shaft 56 mounted in the journal 57 of the block 45. A circular head 58 is suitably mounted in the block 45 surrounding the shaft 56 and concentric therewith. The head 58 is provided with two diametrically disposed dogs 59 with which co-act ratchet teeth 60 on the lower end of the shaft 56. A bullet catch 61 is provided in the head 58, for which are provided sockets 62 in the block 45. On the lower face of the head 58 there is a boss 63, so disposed as to be brought into line vertically with the fingers 41 and 42, alternately.

In Figs. 7 and 8, I have illustrated means for retaining the casement C in the frame F when the casement C is tilted in the position shown in full lines in Fig. 1. These means

serve to hold the bottom of the casement C closely adjacent the bottom of the frame F against the stool 2. I provide a lug 64 near the bottom of each side stop 4, and a recess 65 in each of the bottom corners of the casement C to form a tongue 66 which engages the lug 64 when the casement C is tilted, as indicated in Fig. 7.

In Figs. 9 and 10, I have illustrated a modified form of retaining means which while serving to hold the bottom of the casement C to the frame F, permits it to rise from the sill 1 and stool 2 when it is tilted, as shown in full lines in Fig. 11. In this form, I provide a flange 67 in place of the side stop 4 and provide the casement C with a recess 68 at each of its bottom corners, in which is mounted a roller 69.

From the foregoing description of the details of construction of the device, its use and operation will be obvious. By rocking the lever 29 by the handle 34, the shafts 19 and 19′ are turned and the arms 10 through the lugs 9 in the slots 8 tilt the casement C. It will be seen that the degree of opening of the casement C is controlled by the degree of movement of the lever 29 over the arcuate rack 36, and since the catch 35 co-acting with the rack 36 serves to lock the lever 29 in adjusted position, the casement C can be tilted as desired and locked in adjusted position. It is to be noted that when the lever 29 is moved to its limit of movement to close the casement C and is locked in such position, the casement C is effectually locked, the lugs 9 in the slots 8 causing the casement C to make a weather-proof fit against the side stops 4 and apron 5. Since there is no fixed pivot for the casement C, as in the ordinary type of hinged casement, my improved casement can be effectually clamped in closed position in the frame.

If the casement C be provided with the fastening means for its lower corners illustrated in Figs. 7 and 8, it will be seen that when the casement C is tilted, as shown in full lines in Fig. 1, its bottom edge is securely held in place in the frame F, so that the casement C cannot be drawn out of the frame F by the impulse of the arms 10, nor can its lower edge rise from the stool 2. However, if the casement C be provided with the retaining device illustrated in Figs. 9, 10, and 11, it will be seen that when the casement C is tilted, the lower edge while retained in the frame F is permitted to rise by reason of the upward impulse of the arms 10 after the lugs 9 have reached the upper ends of the slots 8 in the side rails 6 of the casement C, so that the casement C may be lifted from the sill 1 into a position shown in full lines in Fig. 11.

In Figs. 12 and 13, I have indicated diagrammatically the relation of the parts as shown in full lines in Figs. 1 and 11 respectively. In Figs. 12 and 13, I have indicated by the reference character "*b*" the distance between the point, at which the link 10 is pivoted in the casement C, and the bottom of the casement C, and by the reference character "*c*" the distance between the point, at which the link 10 is pivoted in the frame F, and the bottom of the frame F, and by the reference character "A" the angle of inclination of the casement C relative to the frame F when the parts are as shown in full lines in Fig. 1, and by the reference character "A′" the angle of inclination, less than 90°, of the casement C relative to the frame F when the parts are as shown in full lines in Fig. 11.

When it is desired to adjust the casement C in the position illustrated in Fig. 2, the parts being in normal position, the lever 27 is raised, thus depressing the shafts 19 and 19′ and causing arms 10 to bring the slots 38 therein into register with the bolts 39. The depression of the arms 10 on the sleeves 11 on the rods 13 causes the pinions 48 to travel over the racks 49 causing rotation of the pinions 48 and through their associated mechanisms rotation of the bosses 63 into position to depress the pins 42, and project the bolts 39 into the slots 38 of the arms 10. Thus it will be seen that the action of depressing the arms 10 causes the arms 10 to become locked to the upper part of the casement C.

When the lever 27 is allowed to return to normal position by action of the springs 16, the arms 10 lifting the casement C into the position shown in dotted lines in Fig. 2, the casement C is positioned so as to clear the stool 2. It is to be noted that when the parts rise into normal position, the ratchet teeth 60 idle over the pins 59, the head 58 being held against rotation by the bullet catch 61, so that the position of the boss 63 is not changed.

When the parts are in position shown in dotted lines in Fig. 2, the lever 29 is rocked and the arms 10 cause the casement C to swing to the position shown in full lines in Fig. 2. It is to be noted that by the desired adjustment of the lever 29, as above described, any desired position of the casement C when so swung may be secured and the casement C be locked in such adjusted position.

When the casement C is again returned to the position shown in dotted lines in Fig. 2, the arms 10 are again depressed, which operation causes the bosses 63 to move into position to depress the pins 41 and retract the bolts 39 from the slots 38 in the arms 10. It is to be noted that the casement C is allowed to come to rest upon the sill 1 before the bosses 63 fall sufficiently to depress the pins 41, thus insuring that the casement C be not freed from the arms 10 until at rest.

Having described my invention, what I claim is:

1. In combination with a casement, means adapted to tilt said casement; and means

adapted to co-act with said tilting means to furnish a hinge for said casement.

2. In a casement, the combination of a frame; a sash; arms pivoted in said frame and having sliding connections with said sash; reciprocating bolts in said sash for engagement with said arms; means for reciprocating said bolts; and means for reciprocating and rocking said arms.

3. In a casement, the combination of a frame; a sash; arms pivoted in said frame and having sliding connections with said sash; bolts in said sash for engagement with said arms; and means for reciprocating and rocking said arms, said reciprocating means being adapted to alternately project and retract said bolts.

4. In a casement, the combination of a frame; a sash; means for tilting said sash relative to said frame; locking means for locking said sash to said tilting means; and means for reciprocating said tilting means which operates said locking means.

5. In combination with a frame therefor, a casement tiltable relative to said frame, and provided with tongues for engagement with lugs on the lower part of said frame, when the casement is tilted.

6. In combination with a frame therefor, a casement tiltable relative to said frame, and provided with means adapted to retain the bottom of said casement in the frame while it is permitted to rise from the sill thereof.

7. In a casement, the combination of a frame; rotatable reciprocable shafts mounted in said frame; rotatable reciprocable arms mounted in said frame and operated by said shafts and provided with lugs and slots; a sash having slots in its side rails to receive said lugs therein, and provided with bolts for insertion into the slots in the arms; means carried by said arms and said frame and operative on the downward movement of the arms and inoperative on the upward movement adapted to alternately project and retract said bolts; a lever for reciprocating said shafts; and a lever for rotating said shafts, the connection between said levers and said shafts rendering the levers alternatively operable.

8. In a casement, the combination of a frame; arms pivoted in said frame and provided with lugs; a sash having slots to receive said lugs therein; a lever; and mechanism connecting said lever and said arms adapted to swing said arms when said lever is reciprocated.

9. In a casement, the combination of a frame; arms reciprocably mounted in said frame, and provided with slots; a sash having bolts for insertion into said slots; a lever; and mechanism connecting said lever and said arms adapted to reciprocate said arms when said lever is reciprocated.

10. In a casement, the combination of a frame; arms reciprocably mounted in said frame and provided with slots; a sash having bolts for insertion into said slots; means for inserting said bolts into and retracting said bolts from said slots; a lever; and mechanism connecting said lever and said arms adapted to reciprocate said arms when said lever is reciprocated.

11. In a casement, the combination of a frame; arms reciprocably mounted in said frame and provided with slots; a sash having bolts for insertion into said slots; means for inserting said bolts into and retracting said bolts from said slots; a lever; and mechanism connecting said lever and said arms adapted to reciprocate said arms when said lever is reciprocated, said bolt operating means being automatically operable by the arm reciprocating mechanism.

12. In a casement, the combination of a frame; arms pivotally and reciprocably mounted in said frame and provided with lugs and slots; a sash having slots to receive said lugs therein and bolts for insertion into the arm slots; a lever; mechanism connecting said lever and said arms adapted to swing said arms when said lever is reciprocated; a second lever; and mechanism connecting said second lever and said arms adapted to reciprocate said arms when said second lever is reciprocated.

13. In a casement, the combination of a frame; an inwardly projecting lug on each side of said frame adjacent its bottom; a sash; and a tongue on each end of the bottom of said sash, so disposed as to engage a lug on the frame, when the sash is resting upon the sill of the frame and is tilted inwardly.

14. In a casement, the combination of a frame; side stops comprising flanges spaced from the sill of said frame; a sash; rollers on the bottom of said sash so disposed as to pass under said flanges when the sash resting on the sill of the frame is tilted, and ride upon said flanges when the sash is raised from said sill.

15. In a closure construction, the combination of a frame; a closure member; connections between said frame and said closure member adapted to limit the pivotal movement of said member relative to said frame, and to retain one edge of said member in said frame, the frame, member and connections thereof being so proportioned and related as to permit the member to be tilted, pivoting on one edge, and then moved into a plane substantially at right angles to the plane of the frame, the edge on which it is pivoted being moved from one end of said frame to a point closely adjacent the opposite end of said frame.

16. In a closure construction, the combination of a frame; arms pivotally mounted in said frame; a sash; slot-and-pin connections

between said arms and said sash; and means adapted to retain the bottom of said sash in said frame while permitting it to move in said frame, the arms, connections and sash being so proportioned and related as to permit the sash to be tilted, pivoting on its bottom, and then moved into a substantially horizontal position, its bottom edge being closely adjacent the top of the frame.

17. In a closure construction, the combination of a frame; arms pivotally mounted in said frame; means adapted to maintain said arms in alignment; a sash; slot-and-pin connections between said arms and said sash; and means adapted to retain the bottom of said sash in said frame while permitting it to move in said frame, the arms, connections and sash being so proportioned and related as to permit the sash to be tilted, pivoting on its bottom, and then moved into a substantially horizontal position, its bottom edge being closely adjacent the top of the frame.

18. In a closure construction, the combination of a frame; a closure member; retaining means mounted upon one edge of said member adapted to retain said edge in said frame while permitting it to move relative thereto; a pair of links, each one of which has one end pivoted on said frame and its other end pivoted on one of the sides of said closure member at a point to be determined by the following formula:

$$b = \frac{c}{\cos A + \sqrt{\sin^2 A' - 1 + \cos^2 A}}$$

in which b is the distance from the pivot point of the link on said member to the edge of said member on which the retaining means is mounted; c is the distance from the pivot point of the link on said frame to the end of the frame adjacent which is located the said edge of said member when the member is in closed position, c being substantially equal to the length of the closure member; A is the angle at which it is desired that the member shall be inclined to the plane of the frame when tilted to the fullest extent permitted by said links, the said edge of the member being located adjacent the said end of the frame; and A′ is the angle, less than 90°, at which it is desired that the member shall be inclined to the plane of the frame when the said edge of the member is moved to its fullest extent relative to said frame, the links being disposed at right angles to the plane of the frame; the element being so related as to assure an operable balance in the closure member as it pivots on the links when its edge is moving in said frame; and means adapted to permit reciprocation in the position of the pivot points on the member relative to the pivot points on the frame, when the member is tilted.

19. In a window construction, the combination of a frame; a sash; means to retain the bottom edge of the sash in said frame while permitting it to move vertically in said frame; a pair of links, each one of which has one end pivoted on said frame, and its other end pivoted on one side of said sash at a point to be determined by the following formula:

$$b = \frac{c}{\cos A + \sqrt{\sin^2 A' - 1 + \cos^2 A}}$$

in which b is the distance from the pivot point of the link on said sash to the bottom edge of said sash, c is the distance from the pivot point of the link on said frame to the bottom of said frame, c being substantially equal to the length of the sash, A is the angle at which it is desired the sash shall be inclined to the plane of the frame when tilted to the fullest extent permitted by said links, the bottom of the sash resting on the bottom of the frame, and A′ is the angle, less than 90°, at which it is desired that the sash shall be inclined to the plane of the frame, when the bottom of the sash is slid upwardly to its fullest extent of movement, the links being horizontally disposed; the elements being so related as to assure an operable balance in the sash as it pivots on the links when its bottom is slid upwardly in said frame; and means adapted to permit reciprocation in the position of the pivot points on the sash relative to the pivot points on the frame, when the sash is tilted.

20. In a casement, the combination of a frame; arms pivoted in said frame; means adapted to automatically maintain said arms in constant alignment with one another; a sash; connections between said arms and said sash; and means adapted to swing said arms.

In testimony whereof I affix my signature.

ALDEN A. POTTER.