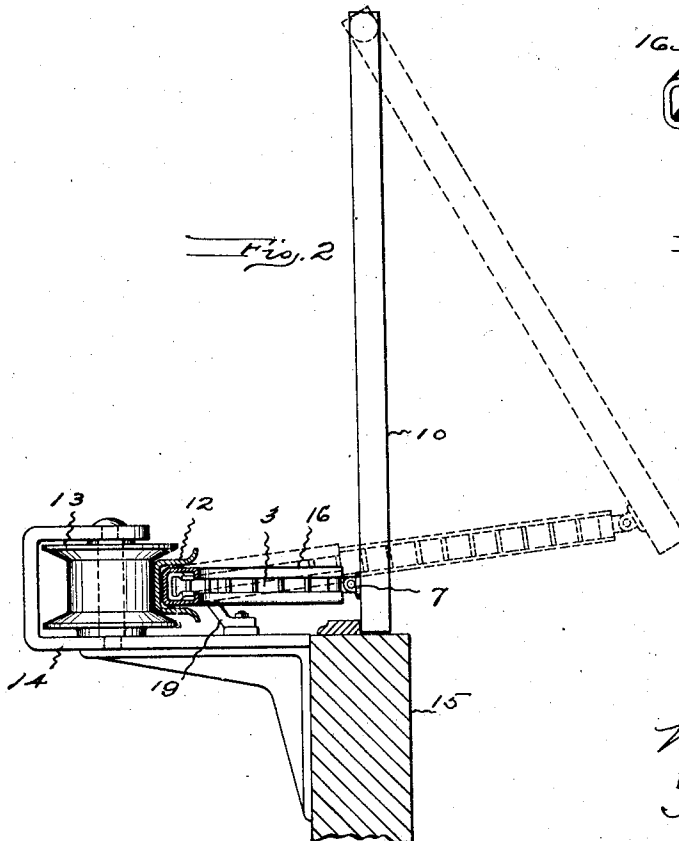
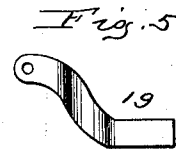
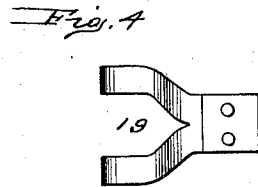
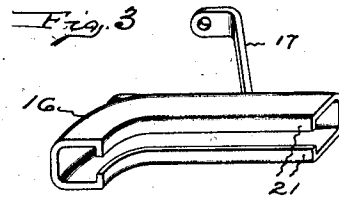
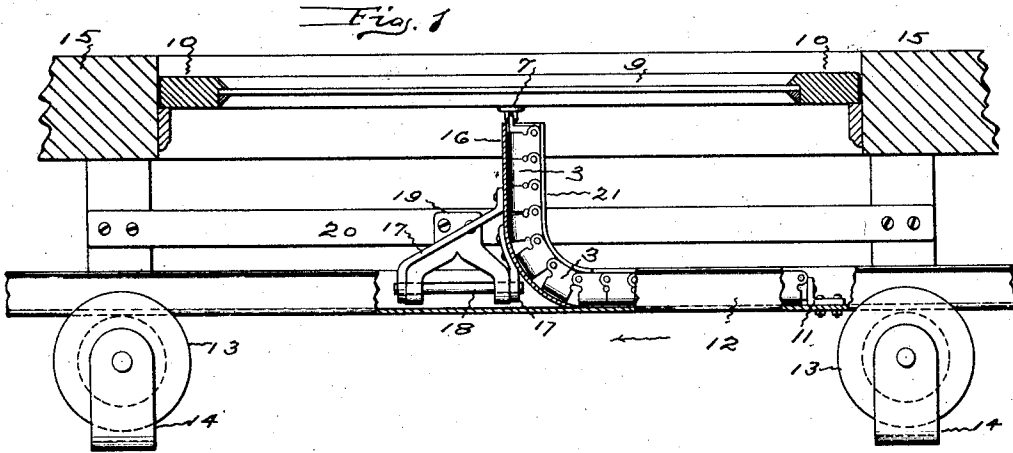


N. H. ANDERSON.  
 WINDOW OPERATING MECHANISM.  
 APPLICATION FILED FEB. 9, 1917.

1,333,595.

Patented Mar. 16, 1920.  
 2 SHEETS—SHEET 1.



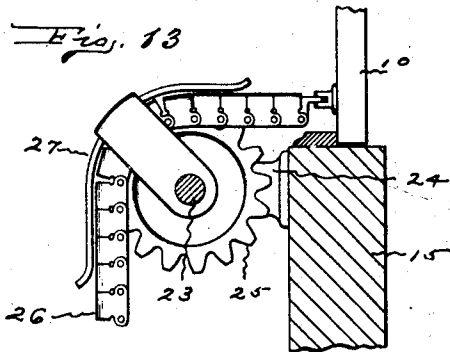
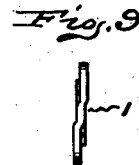
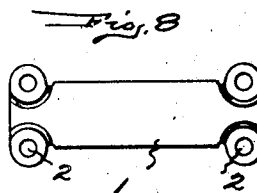
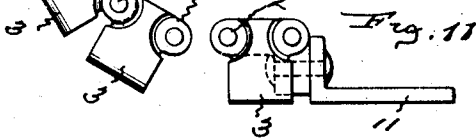
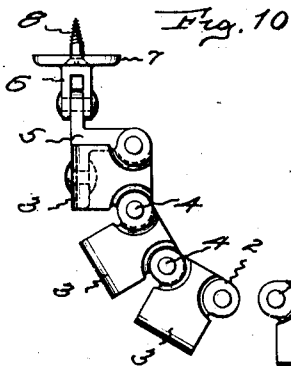
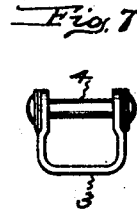
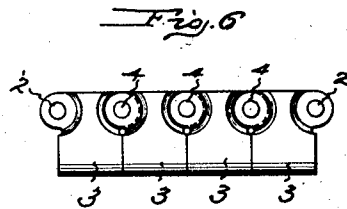
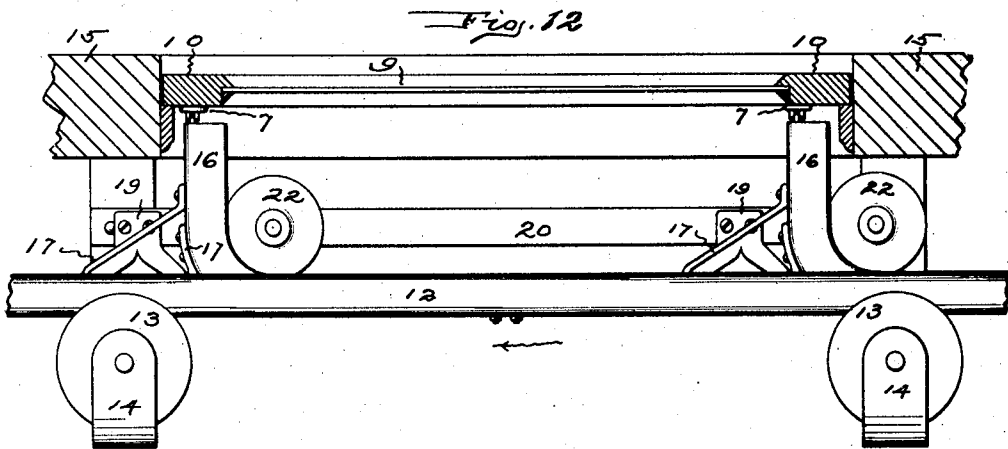
INVENTOR.

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 BY *Harry P. William*  
 ATTORNEY.

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# UNITED STATES PATENT OFFICE.

NILS H. ANDERSON, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO THE G. DROUVE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF CONNECTICUT.

## WINDOW-OPERATING MECHANISM.

1,333,595.

Specification of Letters Patent. Patented Mar. 16, 1920.

Application filed February 9, 1917. Serial No. 147,612.

*To all whom it may concern:*

Be it known that I, NILS H. ANDERSON, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented a new and useful Improvement in Window-Operating Mechanism, of which the following is a specification.

This invention relates to a means which is particularly adapted for simultaneously opening and closing a series of windows that have pivotally hung sash.

The object of the invention is to provide such a means which is simple, thereby insuring cheapness of manufacture and installation; which is compact, whereby when installed it occupies but little space and is comparatively inconspicuous; and which is easily operated and yet very powerful in action so it may be manipulated by any one with a certainty that the sash, no matter how many in the series, will be pushed open in unison and drawn tightly closed when desired.

In attaining this end a chain is so constructed that it can be bent in one direction only and when fixed at two points becomes between those points rigid in all directions whereby end pressure, to any amount within the limit of the strength of the materials, can be applied without having the chain flex. One or more sections of such a chain are connected to each of the sash to be opened and to an operating member that is movably supported parallel with the swinging edges of the sash, so that when this operating member is moved in one direction the chains push the sash open and when the operating member is moved in the opposite direction the chains draw the sash closed.

In the accompanying drawings Figure 1 shows a plan, with part cut away, of a portion of an apparatus that embodies the invention connected to a window casing and the middle of a sash. Fig. 2 shows a side elevation of the same. Fig. 3 is a perspective view of a shoe that may be used for guiding the chain. Fig. 4 is a plan of the shoe supporting bracket. Fig. 5 is an edge view of the shoe supporting bracket. Fig. 6 shows a plan view of a few links of the chain. Fig. 7 shows an end view of a chain link. Fig. 8 shows a plan of a blank from which a link is formed. Fig. 9 shows an edge view of the link blank. Fig. 10 shows

a means for attaching one end of the chain to a sash. Fig. 11 shows a means for attaching the other end of a chain to an operating member. Fig. 12 shows a plan of the apparatus as it may be arranged when two chains are used for each sash. Fig. 13 shows a side view of a modified arrangement of the operating means.

Each chain link may be formed of a stamped blank 1, Fig. 8, that is provided with two pivot openings 2 at each end, the pivot openings on one edge being offset in one direction, and the pivot openings on the other edge being offset in the other direction (as shown in Fig. 9) so that the links will fit together when assembled. These blanks are bent so as to form a link 3 which is U-shape in cross section as shown in Fig. 7, and the links are fastened together by pivot studs 4. When the links are thus put together and are in a straight line as in Fig. 6, they form practically a channel iron that will stand as much endwise thrust as the strength of the material will sustain, and this channel can only be flexed in one direction (as in Fig. 10).

One end of a short section of chain thus formed may be secured to a bracket 5 that is pivoted to ears 6 projecting from a plate 7 which may be fastened by screws 8, or otherwise, either to the middle of the cross rail 9 of the window sash, as shown in Fig. 1, or the ends of two sections of chain may be fastened by such means to the side rails 10 of the sash, as shown in Fig. 12. If the sash is of ordinary width one chain is usually used; if the sash is wide and heavy two chains are desirably used. The other end of each section of the chain may be secured to a bracket 11 and this bracket may be fastened to the inner face of a channel iron 12 when such a structure is employed as the operating means. This channel iron extends along the building parallel with the swinging edges of all of the sash that are to be opened simultaneously, and it is shown as movably held by grooved rollers 13, the rollers being arranged so as to support and back the channel iron. These rollers are pivotally mounted in brackets 14 that are fastened to the casing 15 at the sides of or below the window opening. The channel iron, which in this case forms the operating member, may be moved longitudinally back and forth by any suitable means.

Extending laterally of and curving around into the channel iron is a hollow shoe 16. This shoe guides the chain from the channel iron to which it is fastened toward the point where the chain is fastened to the sash. The shoe, in order that it may have a slight oscillation, is provided with arms 17 which are mounted on an axle 18 that is supported by the arms of a bracket 19 attached to a bar 20 extending between the brackets 14. The shoe may as shown in Fig. 3 have its inner edges 21 bent toward each other for the purpose of retaining the chain within it. If it is desired to have the chain run a little easier a roller 22 may be located on the inside of the bend of the chain, as shown in Fig. 12.

With the structure described when the operating member, which is shown in the shape of a channel iron but which may have some other shape, is pushed in one direction, for instance, as shown by the arrows on Figs. 1 and 12, the chains connected to the operating member are pushed outwardly through the shoes so as to force the sash open at the bottom when they are top-hung, the shoes oscillating to permit the chains to swing up with the lower ends of the sash. As the chain described can flex in but one direction when free and cannot flex in any direction between two fixed points and therefore is as strong as a channel iron of similar cross section, great pressure may be applied to its inner end so that the sash will be surely swung open, and as the chain is fastened at its outer end to the sash and is held in a fixed position by the shoe, it cannot flex at any point between the sash and the shoe, no matter how great the end pressure which is being exerted to push it out, or how great the resistance the sash offers to an opening movement. When the operating member is moved in the opposite direction the chain is drawn in to the shoe and the sash is swung closed.

If desired the operating member may, as shown in Fig. 13, be a tube or shaft 23 rotarily mounted in brackets 24, this shaft being rotated by any convenient means. The shaft extends parallel with the swinging edges of the sash and opposite each has a sprocket wheel 25. A chain 26 connected with the sash is passed over the sprocket and beneath a shoe 27 which is hung on the shaft. Rotating the shaft causes the sprocket to push or pull the chains according to the direction of rotation of the shaft, and thus open or close the sash.

This mechanism can be located at the top or the bottom of a series of windows according to how the sash are hung and may be constructed to extend a distance of many feet along the side of the building, depending upon the number of windows that it is desired to open and close simultaneously,

and the sash of these windows must all be forced open and all be drawn tightly closed when the operating member is moved. The parts of this mechanism are few and simple so that the structure will occupy but a little space and afford no material obstruction to access to the windows.

The invention claimed is;

1. The combination with a fixed casing and a window sash hinged at its upper edge to said casing so its lower edge swings outwardly for opening and inwardly for closing, of a metallic chain that is flexible in one direction only and is rigid when pushed or pulled longitudinally, said chain having one end secured to the outwardly swinging lower edge of the sash and its other end extending inwardly therefrom across the casing, a movable guide mounted inside of the casing and bearing on the back of and holding said chain so it cannot bend between the guide and the sash, and means movably mounted inside of the casing and connected with the inner end of the chain and adapted when manipulated to push the chain through said guide outward across the casing and swing the window outward and to pull the chain inward across the casing through said guide and swing the window inward.

2. The combination with a fixed casing and a window sash hinged at its upper edge to said casing so its lower edge swings outwardly for opening and inwardly for closing, of a metallic chain that is flexible in one direction only and is rigid when pushed or pulled longitudinally, said chain having one end secured to the outwardly swinging lower edge of the sash and its other end extending inwardly therefrom, a curved shoe mounted inside of the casing and bearing on the back of and holding said chain from flexing between the shoe and the sash, and means supported inside of the casing and connected with and adapted when manipulated to push the chain through said shoe outward across the casing and swing the lower end of the sash outward and to pull the chain inward across the casing through said shoe and swing the lower end of the sash inward.

3. The combination with a fixed casing and a window sash hinged at its upper edge to said casing so its lower edge swings outwardly for opening and inwardly for closing, of a metallic chain that is flexible in one direction only and is rigid when pushed or pulled longitudinally, said chain having one end secured to the outwardly swinging lower edge of the sash and its other end extending inwardly therefrom, a curved tubular shoe mounted inside of the casing and bearing on the back of and holding said chain so it cannot bend between the shoe and the sash, and means supported inside of the casing and connected with the chain in-

side of the casing and adapted when manipulated to push the chain through said shoe outward across the casing and swing the lower end of the sash outward and to pull the chain inward across the casing through said shoe and swing the lower end of the sash inward.

4. The combination with a fixed casing and a window sash hinged in said casing so as to swing outwardly for opening and inwardly for closing, of a metallic chain that is flexible in one direction only and is rigid when pushed or pulled longitudinally, said chain having one end secured to the outwardly swinging end of the sash and its other end extending inwardly therefrom, a curved tubular shoe pivotally mounted inside of the casing and bearing on the back of and holding said chain from flexing between the shoe and the sash, a bar supported and movable horizontally inside of the casing, rolls supporting said bar, and means connecting the inner end of the chain with the bar whereby said bar is adapted when manipulated to push the chain through said shoe outward across the casing and swing the window outward and to pull the chain inward across the casing through said shoe and swing the window inward.

5. The combination with a fixed casing and a window sash hinged in said casing so as to swing outwardly for opening and inwardly for closing, of a metallic chain that is flexible in one direction only and is rigid when pushed or pulled longitudinally, said chain having one end secured to the outwardly swinging end of the sash and its other end extending inwardly therefrom, a curved shoe mounted inside of the casing and bearing on the back of and holding said chain so it cannot flex between the shoe and the sash, and a bar supported and movable horizontally inside of the casing, the inner end of said chain being connected to the bar whereby said bar is adapted when manipulated to push the chain through said shoe outward across the casing and swing the

window outward and to pull the chain inward across the casing through said shoe and swing the window inward. 50

6. The combination with a fixed casing and a window sash hinged in said casing so as to swing outwardly for opening and inwardly for closing, of a metallic chain that is flexible in one direction only and is rigid when pushed or pulled longitudinally, said chain having one end secured to the outwardly swinging end of the sash and its other end extending inwardly therefrom, a curved shoe mounted inside of the casing and bearing on the back of and holding said chain from flexing between the shoe and the sash, and a longitudinally movable channel bar supported inside of the casing, the inner end of said chain lying in and being connected to the channel bar whereby said channel bar is adapted when manipulated to push the chain through said shoe outward across the casing and swing the window outward and to pull the chain inward across the casing through said shoe and swing the window inward. 65

7. The combination with a fixed casing and a window sash hinged in said casing so as to swing outwardly for opening and inwardly for closing, of a metallic chain that is flexible in one direction only and is rigid when pushed or pulled longitudinally, said chain having one end secured to the outwardly swinging end of the sash and its other end extending inwardly therefrom, a curved shoe pivotally mounted inside of the casing so as to swing with the chain said shoe bearing on the back of and holding said chain from flexing between the shoe and the sash, and means supported inside of the casing and engaging said chain inside the shoe and adapted when manipulated to push the chain through said shoe outward across the casing and swing the window outward and to pull the chain inward across the casing through said shoe and swing the window inward. 80 85 90

NILS H. ANDERSON