

Oct. 23, 1923.

1,471,534

E. H. SMYTHE

WINDOW SCREEN

Filed May 15, 1920

2 Sheets-Sheet 1

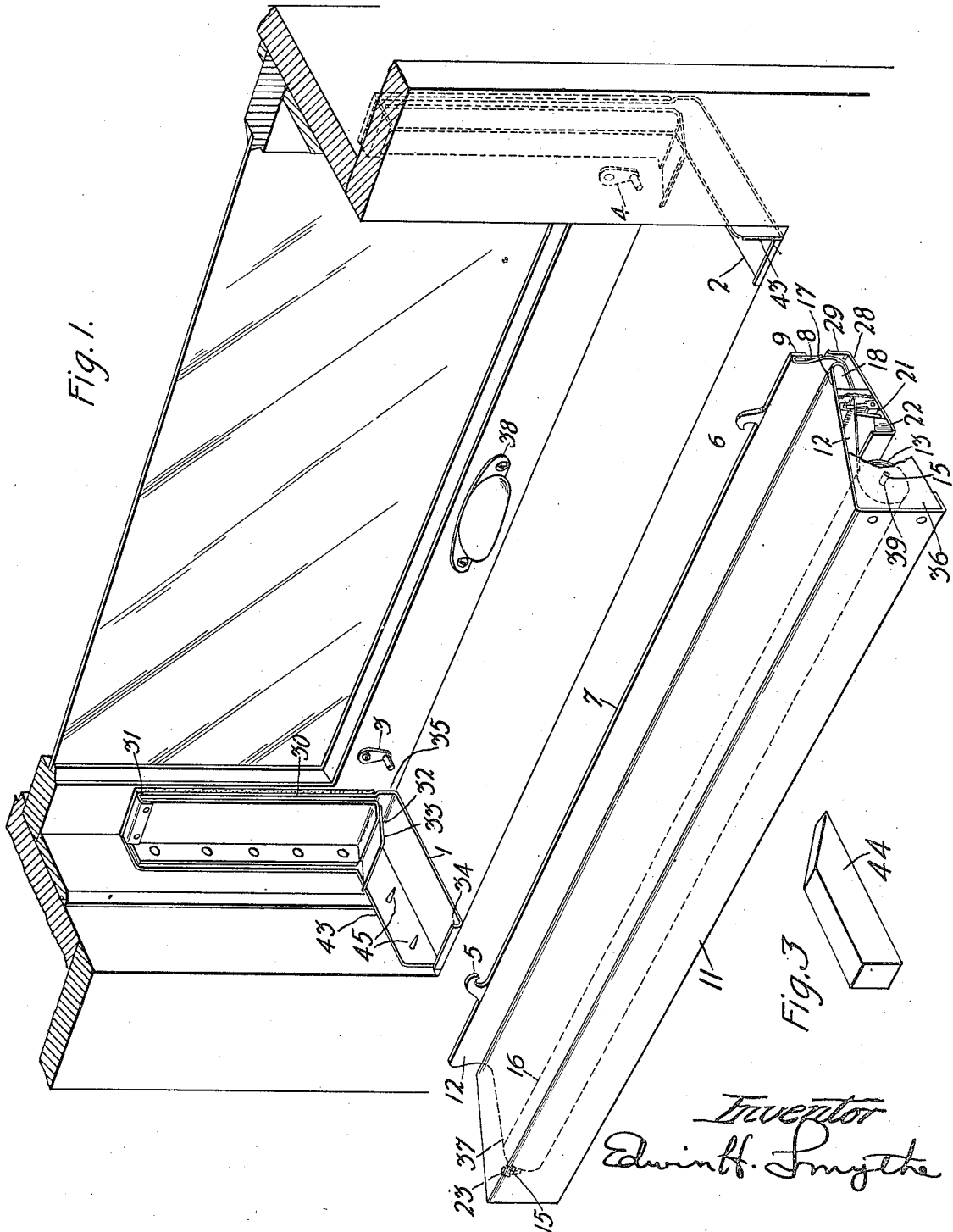


Fig. 1.

Fig. 3

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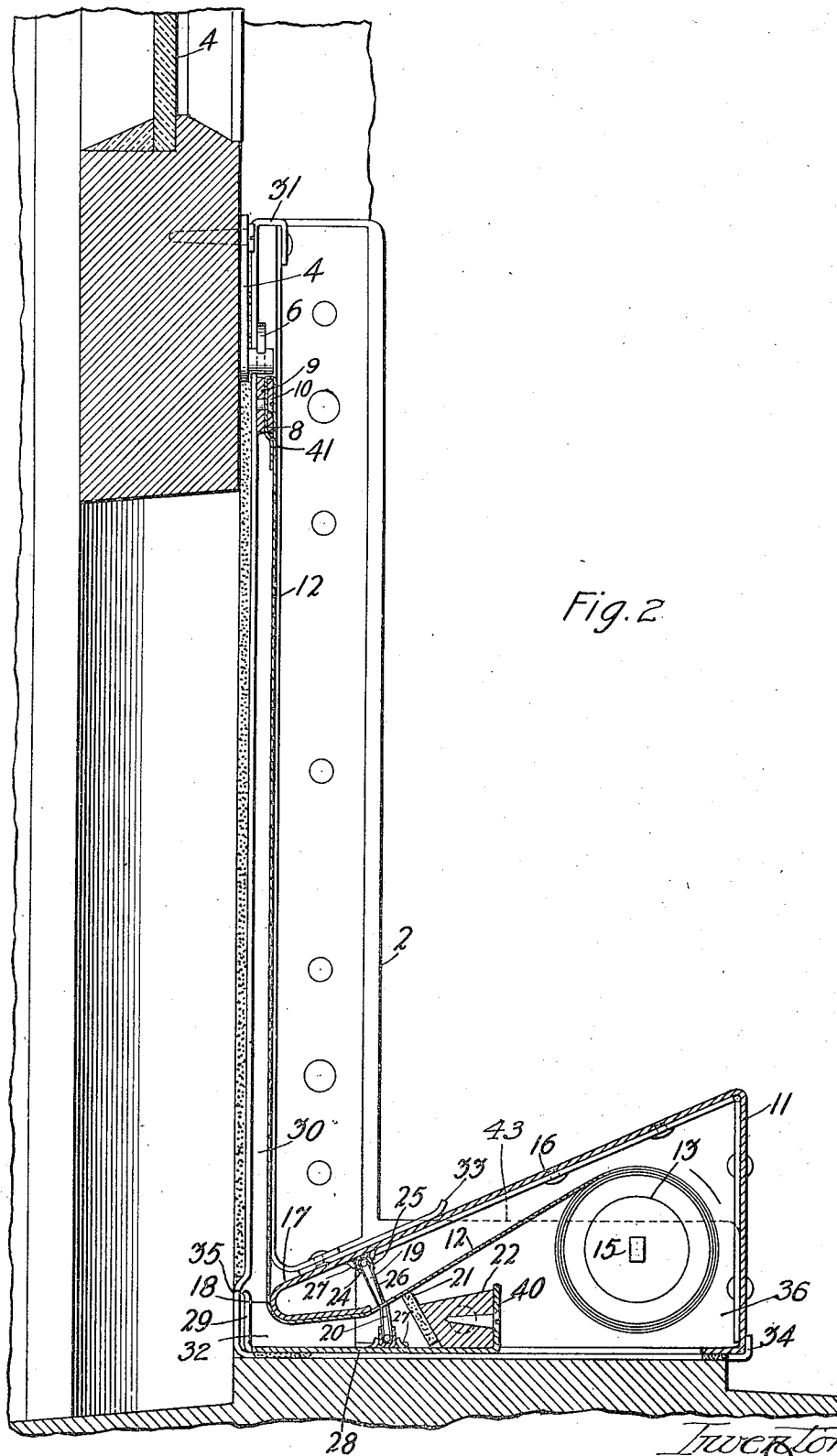


Fig. 2

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Patented Oct. 23, 1923.

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UNITED STATES PATENT OFFICE.

EDWIN H. SMYTHE, OF EVANSTON, ILLINOIS.

WINDOW SCREEN.

Application filed May 15, 1920. Serial No. 381,690.

To all whom it may concern:

Be it known that I, EDWIN H. SMYTHE, a citizen of the United States, residing at Evanston, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Window Screens, of which the following is a full, clear, concise, and exact description.

This invention relates to a collapsible window screen, and particularly to a device for interposing a screen across a window or other like opening to constitute a barrier with respect to foreign substances such as dirt and dust, while at the same time permitting the passage of air for ventilating purposes.

It is the principal object of this invention to provide a window screen or ventilator of this character that may be readily placed in and removed from the window, that will substantially prevent the passage of air currents at all points except where the screen is interposed, that will keep the screen interposed at all times during the opening and closing of the window, that will automatically adjust the screen to the changing window opening, collapsing the screen as the window is lowered and permitting its extension as the window is raised, that will effect an automatic cleaning of the screening element to prevent it from becoming clogged and ineffective from accumulations of dust and dirt, that will provide for the catching or trapping and convenient removal of the collected dust and dirt, that will be automatically guided to bring its parts into cooperative relation with the window sash and casing when it is put into place, that will be held securely in position when applied to the window and will be readily detached therefrom when it is desired to remove the same, and that may be left in position, but permit the ready detachment of the screen element from the sash to permit the free upward movement of the sash when it is desired to throw open the window to its fullest extent and beyond the limit of travel of the screen. It is also the object of this invention to provide an improved cleaning device or brush for use with a window screen or ventilator of this character.

The foregoing and other objects it is the aim of this invention to attain in a structure that is strong, compact and simple in its construction, readily disassembled to per-

mit the substitution or replacement of parts, and that is adjustable to windows of various widths.

The invention in its preferred form is illustrated in the accompanying drawings in which Fig. 1 is a perspective view of a portion of the window and its casing with the end pieces or sockets in position upon the casing, and the screen casing and its associated parts in readiness to be thrust into the sockets, excepting that, for clearness of illustration, the edge strip is shown slightly lifted from its socket in the casing; in which Fig. 2 is a vertical cross-section of a window casing with the window sash in its raised position and with the collapsible screen and its associated parts in position in the window; and in which Fig. 3 is a perspective view of a filler block used to fill in unoccupied space at the end of the screen casing.

Referring to the drawings, the window screen or ventilator of this invention consists primarily, in its present embodiment, of the two end sockets or brackets 1 and 2, the screen casing 11 with its associated parts, and the connecting members 3 and 4. The end sockets or brackets 1 and 2 are secured to the window casing at opposite sides of the window with the foot of each bracket resting upon the window sill, the face of the bracket bearing against the corresponding vertical member of the window frame, and with the side of the bracket resting against the side of the window casing. The swinging posts or connecting members 3 and 4 are pivotally secured, as by means of wood screws, to the lower sash of the window in suitable position to permit their engagement, when the screen casing 11 is in position, with cooperating connecting members or hooks 5 and 6 carried upon the edge strip 7 of the screen.

In the present embodiment of the invention, the screen casing 11 is substantially wedge-shaped or triangular in outline. The screen proper, indicated at 12, is flexible, and is collapsed in the present instance by being wound upon a roller 13 which is mounted in the enlarged or rear portion of the wedge-shaped casing. The roller 13 may be a window shade roller and may be either of the wooden or of the extensible sheet metal variety, both of these forms being well known in the art. This roller, as is customary in the case of the well known window shade rollers, may be hollow

and contain a helical spring which is normally placed under sufficient tension to cause it to exert a pull or retractile force upon the flexible screen tending to draw the screen into the casing. The roller 13 may also, as is customary, be provided with pintles 15, one of which is cylindrical and the other of which is rectangular or squared. The cylindrical pintle has its bearing in a round hole in one of the end pieces 36 of the casing, while the other pintle has its bearing in a squared bearing 23 in the other end piece 37 of the casing. This squared bearing in the end piece 37 may be key slotted so that by lifting the squared pintle into the enlarged part of the key slot, the pintle may be rotated either to increase or reduce the tension in the retractile spring of the roller to any desired degree.

The screen casing 11 may be bent up out of sheet metal so that the rear portion or wall of the casing is substantially vertical, with the top of the casing shell extending forwardly and downwardly to bring the forward edge of the casing that is closest to the window sash to a point as near the level of the window sill as possible. This is in order that the forward part of the casing may be in substantial engagement with the window sash at a point sufficiently low so that it will not be interfered with by the handles with which window sashes are usually provided.

The forward portion or edge of the top of the casing shell 16 is rounded, preferably by being bent downwardly and inwardly, to form a rounded lip 17; and the edge of the rounded lip 17 within the casing may be left open to form a trap 18, the function of which will presently be described. The lower edge of the rear or vertically-extending portion of the casing shell 16 may be turned inwardly substantially at right angles to the rear wall of the shell to form a foot upon which the casing rests when it is thrust into the end sockets or brackets 1 and 2 upon the window sill. Into the ends of the casing shell 16 are fitted two end pieces 36 and 37, which are formed so as to conform to the contour of the cross-section of the casing shell, and which are provided with the key slotted bearing 23 and the round bearing 39 for the pintles of the roller, as hereinbefore described. The end pieces 36 and 37 may conveniently be formed of sheet metal with the edges turned inwardly to form bearing webs for engagement with the inner surfaces of the respective ends of the casing shell. The end pieces do not completely close the ends of the casing shell, but instead are terminated a short distance to the rear of the forward edge of the rounded lip 17 so as to leave the ends of the trap 18 open. One of the end pieces of the casing may, if desired, be permanent-

ly secured in place, while the other may be made removable to facilitate the assembling of the parts that form the screen casing unit 11.

The casing shell 16 comprises only the vertical rear wall and the inclined front wall with its rounded lip 17. With the shell 16 is assembled a lower member 28 formed preferably of sheet metal bent to form a flat portion, the rear edge of which may, if desired, be bent up into a substantial vertical portion 40. Parts of the forward edge of the lower member 28 may be bent up to form socketing lugs 29.

In the angle formed between the upper surface of the lower member 28 and the rear upturned portion 40 is mounted a backing strip 22 carrying a sealing strip 21 arranged to bear against the lower surface of the screen 12. The backing strip may be of wood and the sealing strip 21 may be of felt secured to the backing strip in any convenient manner; or ordinary weather strip of suitable form may be used. The backing strip 22 may be fastened to the lower member 28 of the casing, and may also be pivotally secured at its ends to the end pieces 36 and 37 of the casing. This pivotal connection forms a fulcrum about which the lower member 28 may be turned, so that the lower member with its associated parts forms a jaw which may be opened to swing its parts away from the upper member of the casing and the screen.

The screen casing 11 is provided, in the preferred embodiment of the invention, with cleaning means for the screen in the form of an upper brush 19 and a lower brush 20. These brushes may be constructed in any suitable manner; but I have found it convenient to construct them as follows: From a strip of hair cloth or lining cloth of the sort which is ordinarily employed as a stiffening lining in coats and the like, and having a warp of rather stiff hair, a strip 26 is cut in such a way that the hair extends across the length of the strip. This strip is laid upon a long, shallow channel 24, which may be of light gauge metal, with the median line or middle of the strip of hair cloth lying above the middle line of the channel; and a locking strip or wire 25 is then forced down upon the strip to carry the middle of the strip into the channel and lock it in place. The edges of the channel are preferably slightly constricted so as to pinch the locking wire and the fabric or hair cloth when it is forced into position; and the form and depth of the channel are preferably made such that the inner surfaces of the channel guide the protruding edges of the strip of hair cloth so that these edges are substantially parallel or slightly converge. The threads that form the wool of the strip are then removed, leaving the hair project-

desirable that the interstices in the screen material be small, so as to catch and prevent the passage through the screen of dust, soot and the like. In this case the screen may be made of a fairly closely woven fabric such as cambric or other cloth adapted for use in ventilators; or it may consist of copper screen of rather small mesh—say, in the neighborhood of 50 to the inch. If the device of the invention is to be employed for such use as that to which ordinary window screens are ordinarily put, it may consist of flexible screen material, either cloth or metal, of a larger mesh. The screen material is, of course, provided with such strengthening or reinforcing tapes or threads as may be necessary to cause it to hold its shape when it is put under the tension to which it is subjected in operation.

In order conveniently to attach the screen 12 to the edge strip 7, the screen fabric of cloth or metal as the case may be, may be provided with a hem through which the binding strip 8 is passed, the binding strip then being fastened to the attaching strip 9 by screws 10 or other suitable detachable connecting means. The inner edge of the screen fabric is attached to the periphery of the cylindrical roller 13, which in this embodiment serves as the screen collapsing means, in any convenient way—such, for instance, as the way in which window shades are attached to their rollers. The roller 13 with the attached screen 12 rolled upon it may then be put in place in the casing, and the removable end piece 37 and the lower member or jaw 28 of the casing secured in place, the screen 12 being pulled out so that its outer edge, terminating in the edge strip 7, protrudes beyond the nose or rounded lip of the screen casing 11. Any desired amount of tension may then be put upon the screen by rotating the rectangular pintle 15 in the enlarged portion of the key-slotted bearing 23 to wind up the roller spring, the tension thus secured being held by then moving the rectangular pintle into the constricted portion of the key slot. This tension upon the screen 12 draws the outer edge toward the interior of the screen casing 11 until the edge strip 7 rests in the socket formed by the socketing lugs 29 and opposed outer surface of the rounded lip 17 of the screen casing. The edge strip 7 is of such dimensions that when the screen is thus drawn as far as possible toward the interior of the casing, the edge strip is seated in the sockets so that its upper edge is approximately even with the upper edge of the extremity of the rounded nose 17. When thus assembled, the screen casing 11, with its contained and associated parts, forms a substantially wedge-shaped unit, all parts of which lie within the bounding surfaces of the casing.

When the device of the invention is to be

applied to a window, the end sockets or brackets 1 and 2 are fastened in position by screws or other suitable means at opposite sides of the window casing, with the felted forward surfaces of the brackets in rubbing contact with the vertical members of the sliding window frame. The movable connecting parts 3 and 4 are secured to the lower sash of the window in proper position to engage the hooks or connecting lugs 5 and 6 of the edge strip 7 when the screen casing 11 is put in place. The filler blocks 44 adjusted to such width as is necessary to fill up the unoccupied spaces at both ends of the casing 11, if such are required on account of the relative dimensions of the screen casing 11 and the width of the window, are then secured in position in the socketing portions 32 of the brackets 1 and 2, as by forcing them onto the sharpened studs 45 projecting from the lateral flanges. The screen casing 11, with the associated parts, may then be slipped into place as a unit by thrusting it forwardly into the socket portions of the two brackets 1 and 2.

When the casing 11 is fully thrust into place, the resilient lips 33 of the brackets cooperate with the ledges 34 to hold the screen casing in place, and the forward movement of the casing brings the hooks 5 and 6 of the edge strip 7 over the posts of the swinging arms 3 and 4 on the sash. When the window is raised, the connection between the posts 3 and 4 and the hooks 5 and 6 causes the screen 12 to be pulled out of the casing 11, the edge strip 7 moving up in the guides constituted by the end socket channels 30, and the upward movement of the edge strip 7, and consequently of the window, being limited by the closures 31 at the top of the channels. The swinging post arms 3 and 4 and their cooperating edge strip hooks 5 and 6 are preferably located as close as convenient to the brackets 1 and 2 in order to secure a stronger and more positive limiting action to the upward movement of the window when the edge strip 7 engages the stops 31 at the top of the channels. As the screen is drawn up and out of the screen casing 11 in the upward movement of the window, the spring roller 13 exerts a retractile force which holds the screen taut, and which draws the screen back into the casing and the edge strip 7 back into its sockets at the nose of the casing when the window is lowered. By swinging the post arms 3 and 4 toward the center of the window, the window may be disengaged from the screen so as to be free to be raised to its full extent. When the window is down or is disengaged from the screen by the inward movement of the arms 3 and 4, the screen casing unit 11 may be withdrawn from the window casing, leaving the window practically unobstructed.

ing to form a brush. Each of the brushes 19 and 20 formed in the manner described above, or of any other suitable form, are then mounted in position upon the upper and lower members of the screen casing 11, with the bristles of the brushes projecting towards and in engagement with the upper and lower surfaces of the screen 12. The brush strips 19 and 20 may conveniently be attached to the members of the casing by forcing them into position between lugs 27 that are struck up from the metal of the casing shell and lower member. The brush strips are preferably so positioned that their bristles engage the upper and lower surfaces of the screen at points as close to the forward edge of the casing 11 as possible; and the positioning of the upper brush strip 19 is preferably such that the dust and dirt brushed from the screen will fall into the trap 18 formed within the rounded lip 17 of the casing shell. The dust and dirt that is brushed from the surface of the screen by the lower brush strip 20 falls upon the upper surface of the lower casing member 28. The dirt that is thus collected may be dislodged and removed from the casing by turning it up on end so as to permit the dirt to fall out lengthwise of the trap and the lower casing member. One of the brush strips 19 and 20 may be found sufficient for cleaning purposes, in which case the other may be omitted.

The end sockets or brackets 1 and 2 for holding the casing element in operative relation with the window, in the particular embodiment of the invention illustrated, may each conveniently be made of sheet metal bent into a form which affords a vertical or upwardly extending channel 30 with a closure 31 at its top and a transverse mouth or socket portion 32 communicating with the lower end of the channel 30. The upper edge of the transverse mouth or socket 32 is provided with a resilient lip 33, which may either be formed integrally with the sheet metal of the end socket, or may be a piece of resilient metal secured to an outwardly turned ledge of the wall of the end socket channel away from the window. The inclination of the resilient lip 33 is such as to conform to the shape of the screen casing, and to exert downward pressure upon the top of the screen casing when it is thrust into position in the socket. The extreme rear edge of the foot of the end socket is turned up to form a ledge 34, and when the screen casing is thrust into the socket, the rear wall of the casing comes to rest just within this ledge, so that the ledge 34 and the resilient lip 33 cooperate to hold the screen casing 11 in position. The foot of the end socket or bracket and the upwardly extending portion of the socket are substantially at right angles to each other, so that when the socket is

placed in position in the corner of the window casing, the front face of the bracket, which may conveniently be covered with a strip of felt, is in flat engagement with the frame of the window. At the lower end of the channel 30 at its intersection with the transverse mouth 32 there is an offset or enlargement 35 which serves to accommodate the lugs 29 at each end of the lower member 28 of the screen casing. This offset is so proportioned that when the screen casing is in position in its brackets, the space between the lugs 29 and the corresponding surfaces of the rounded lip 17 of the screen casing 11 form in effect extensions of the corresponding end socket channels 30. The width of the channel 30 is such as just to accommodate the thickness of the edge strip 7 of the screen 12. The brackets 1 and 2 are also provided with lateral flanges 43 bent up at right angles to the foot and channel portions of the socket to provide bearing surfaces for the sockets against the sides of the window casing; and the brackets 1 and 2 may be fastened to the window casing by screws passing through these lateral flanges.

The dimensions of the various elements of the window screen of this invention in the form described are adapted to the dimensions of the window with which the device is to be used. The length of the channels 30 of the brackets 1 and 2 may be such as to permit as much upward movement of the edge strip 7 in the channels as is necessary to provide the desired screened window opening when the window is raised; and the length of the screen casing 11 may be adapted to the width of the window to which the screen is to be applied. The construction of the device is such that a certain latitude of adjustment to windows of different widths is provided for any given length of casing 11, as the ends of the casing 11, if the window frame is somewhat narrower, may be fully seated in the end sockets or brackets, and if the window frame is somewhat wider, may be seated less deeply in the two brackets. Whatever clearance there is between the ends of the screen casing 11 and the lateral flanges 43 upon the feet of the respective brackets 1 and 2 may be filled in any suitable manner, as, for instance, by means of filler blocks 44. These may conveniently be of wood of substantially the form shown in Fig. 3, and with the grain of the wood preferably running at right angles to the length of the casing so that the blocks may be adjusted by splitting to adapt them to the clearance spaces they occupy at the time the window screen is installed.

The screen 12 may be of any convenient or suitable material having the characteristics adapted for the use for which the device of the invention is intended. In certain of the uses to which the device may be applied, it is

As the screen 12 moves out of and into the casing 11 as the window is raised and lowered, the surfaces of the screen pass between the brushes 19 and 20, and by this relative movement the brushes act to dislodge dirt and dust from the screen and keep it clean so as to cause it to obstruct the passage of air through the screen no more than is necessary in securing the screening action that is desired. The dust and dirt dislodged by the brushes collect in the interior of the casing, and, as hereinbefore stated, may be removed by up-ending the casing and permitting the accumulation to fall out. The construction is such that whenever, on account of wear or for any other reason, it is desired to remove and replace the brushes 19 and 20 or the screen 12, this may be done with a minimum of effort.

20 If desired, a narrow strip of elastic fabric, such as that used in the elastics of commerce, and having the desired degree of elasticity, may be interposed between the screen fabric 12 and the hem 41 that secures the screen to the edge strip 7. This acts to equalize the tension upon the screen 12 in case there should be any inequality of pull exerted upon different portions of the width of the screen 12 by the roller 13.

30 To prevent any slight leakage of un-screened air that might otherwise occur by way of the unoccupied portions of the channels 30 of the brackets 1 and 2, such portions, when the dimensions are such that the screen casing 11 is somewhat shorter than the width of the window casing, may be filled with strips of material such as felt; and felt may also be applied to the front of the edge strip 7, and to other surfaces where slight leakage of air might otherwise occur. To complete the sealing of all portions of the window, excepting the opening across which the screen or ventilating fabric is stretched, a weather strip with a tongue of elastic felt or other suitable material may be attached to the lower surface of the lower sash of the upper section or half of the window in such a way that the tongue engages the outer surface of the glass of the lower window. This will serve to prevent the passage of air up between the two window sections when the lower section is partially opened. The length and flexibility of the tongue may be such that it will yield and permit the lower sash of the lower section to move past it when the lower half of the window is moved all the way up and the upper half is moved all the way down, as happens occasionally when the window is washed.

I claim:

1. In a roller screen, the combination with a spring roller having a screen wound thereon, of a fastening strip secured to the free end of said screen, means for securing said

strip to a window sash, and a strip of elastic fabric interposed between said fastening strip and said screen for equalizing the pull of said spring roller and keeping the surface of said screen taut.

2. In a roller screen, the combination with a roller having a flexible screen wound thereon, of means for attaching said roller to a window casing, means for securing an edge of said screen parallel with said roller to the window sash, cleaning means arranged to engage the surface of said screen and automatically clean the same as the screen winds off of and onto the roller in the raising and lowering of the window, and a dust trap in co-operative relation with said cleaning means.

3. A window screen, comprising a casing containing an extensible, flexible screen having an edge strip adapted to be detachably secured to a window sash, and end sockets with rearwardly presented openings for receiving the ends of said casing after said sockets are in place in the window frame and formed with upwardly extending channel portions for guiding the upward and downward movement of said end strip in a plane substantially parallel with the plane of the window and in substantial engagement with the window sash.

4. In a window screen, the combination with a casing of substantially triangular cross-section, the apex of said casing being open and formed with a downwardly and inwardly curved portion to constitute a rounded nose, the interior of which constitutes a longitudinally extending trap, of a screen mounted within said casing and having its forward edge arranged to project out through the open apex of said casing, means for detachably securing the outer edge of said screen to a window sash, retractile means for permitting said screen to be drawn out of said casing when the window sash is raised and acting to draw said screen back into said casing when the sash is lowered, and a longitudinally extending brushing device arranged to engage said screen at a point within said casing close to and behind said longitudinally extending trap.

5. In a window screen, the combination with a casing containing an extensible screen provided with retractile means for drawing it back into the casing when it is withdrawn therefrom, of end sockets adapted to receive the ends of said casing, said sockets each consisting of a transversely extending portion into which the associated end of the casing is adapted to be thrust and from which it is adapted to be withdrawn when said sockets are mounted on a window frame, and a longitudinally extending channel communicating with said transversely extending portion, said longitudinally extending portion being adapted to lie against the

front portion of a window frame and being adapted to receive the corresponding edge of said screen as it is extended and guide the same to move upwardly and downwardly in a plane parallel with the plane of movement of the window sash and in substantial engagement with the sash in its movement.

6. In a window screen, the combination with a casing containing an extensible screen provided with retractile means and having a strip to which the outer edge of said screen is secured, of end sockets for said casing adapted to be secured to opposite sides of a window casing, said sockets each having an open mouthed portion into which the corresponding end of the casing is thrust as it is moved toward the window sash, and said open mouthed portion of each socket having a resilient lip and a ledge co-operating to grasp and hold in position the corresponding end of said screen casing when it is thrust into the socket.

7. In a window screen, the combination with a flexible screen, of a substantially wedge-shaped casing therefor, means for collapsing said screen within said casing, means for automatically grasping and holding said casing in a window frame with the nose of said casing substantially in engagement with the window sash, and means for automatically engaging and detachably securing the free edge of said screen to the window sash.

8. In a window screen, the combination with a flexible screen, of a substantially wedge-shaped casing therefor, a roller mounted longitudinally of said casing in the large portion thereof, fastening means for holding said casing in position on a window sill with the small portion or nose of said casing close to the window sash, and means for automatically engaging said casing with said fastening means and the free edge of said screen with the window sash in placing said casing in position.

9. A roller screen for windows, comprising a flexible screen, a roller upon which said screen is normally rolled, a casing having the said roller mounted rotatably in the rear portion thereof and having a constricted forward portion through which the free edge of said screen is adapted to pass when the screen is unrolled, cleaning means mounted within said casing and adapted to engage a surface of said screen as the same passes through the constricted portion of said cas-

ing, dust trapping means within said casing adjacent said cleaning means, means for securing said casing with its included parts in place in a window casing, and means for detachably securing the free edge of said screen to the window sash.

10. In a window screen, the combination with a substantially wedge-shaped casing containing a collapsible, flexible screen with resilient means for drawing said screen into said casing, of means for securing said casing in a window casing with the nose of said screen casing presented toward and close to the window sash, means for detachably securing the free edge of said screen to said window sash, and a strip of interposed elastic material for equalizing the pull of said resilient means and keeping the surface of said screen taut.

11. In a window screen, the combination with a casing containing a flexible screen with resilient means for drawing said screen into said casing when it is withdrawn therefrom, of means for attaching the free edge of said screen to a window sash, and cleaning means within said casing for engaging and cleaning the surface of said screen as it is moved into and out of said casing, a portion of said casing constituting a dust trap and a bearing surface for the said screen.

12. In a window screen, the combination with a casing containing a screen having means for drawing it back into the casing when it is withdrawn therefrom, of attaching means automatically operated to attach the free edge of said screen to a window sash and said screen casing to the window casing when said casing is placed in position in a window frame.

13. In a window screen, the combination with a screen element including a collapsible screen having a free edge adapted for attachment to a window sash, of end sockets for said screen element, said end sockets being adapted to be secured to opposite sides of a window casing and to receive opposite ends of said screen element, and means automatically operated in placing said screen element in position in said end sockets for attaching the free edge of the screen to the window sash.

In witness whereof I hereunto subscribe my name this 13th day of May, A. D., 1920.

EDWIN H. SMYTHE.