

Dec. 2, 1958

R. M. WOMACK ET AL
BUNDLE CLIPPING MACHINE

2,862,289

Filed Nov. 18, 1954

5 Sheets-Sheet 1

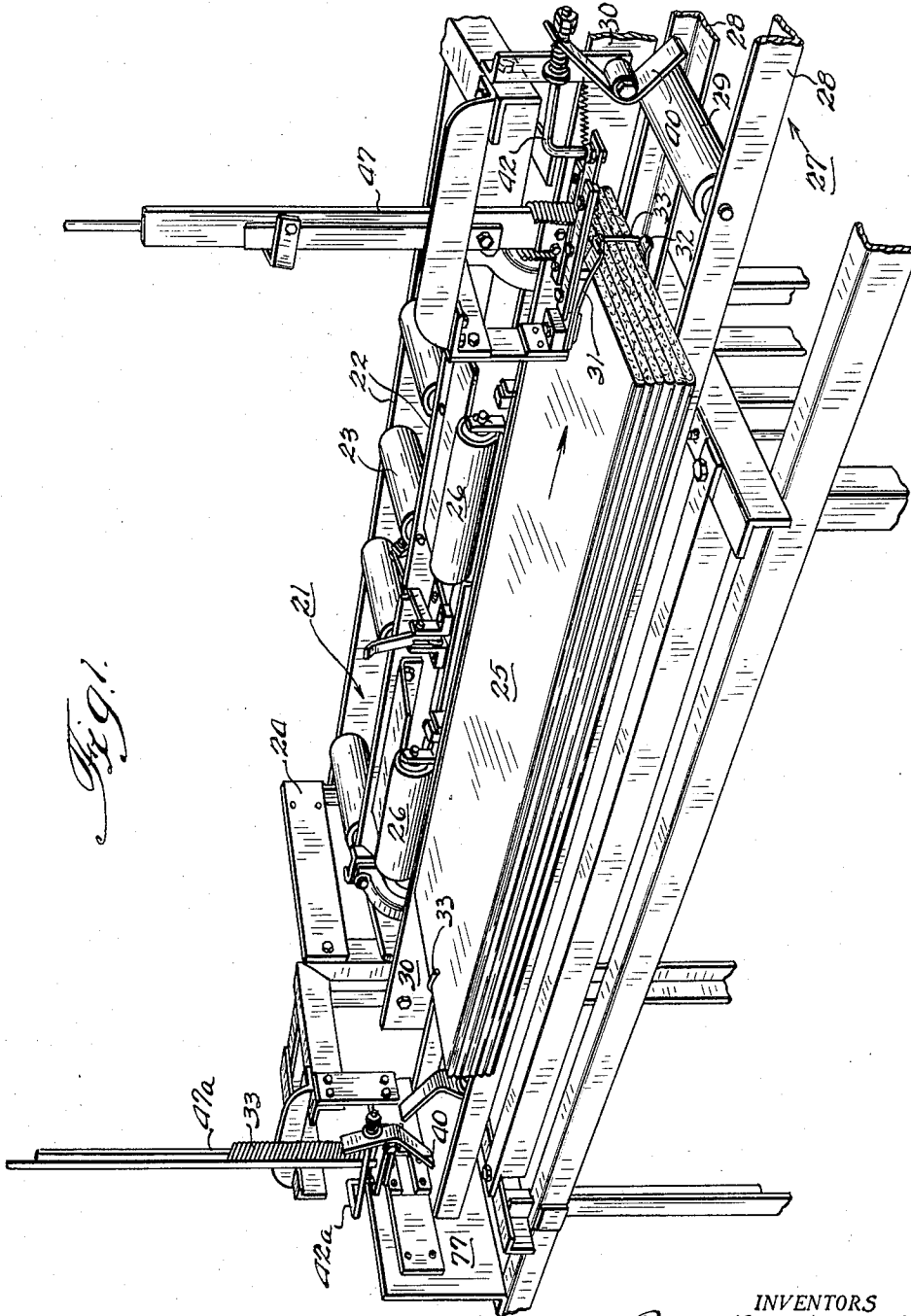


Fig. 1.

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Fig. 2.

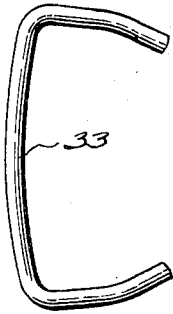
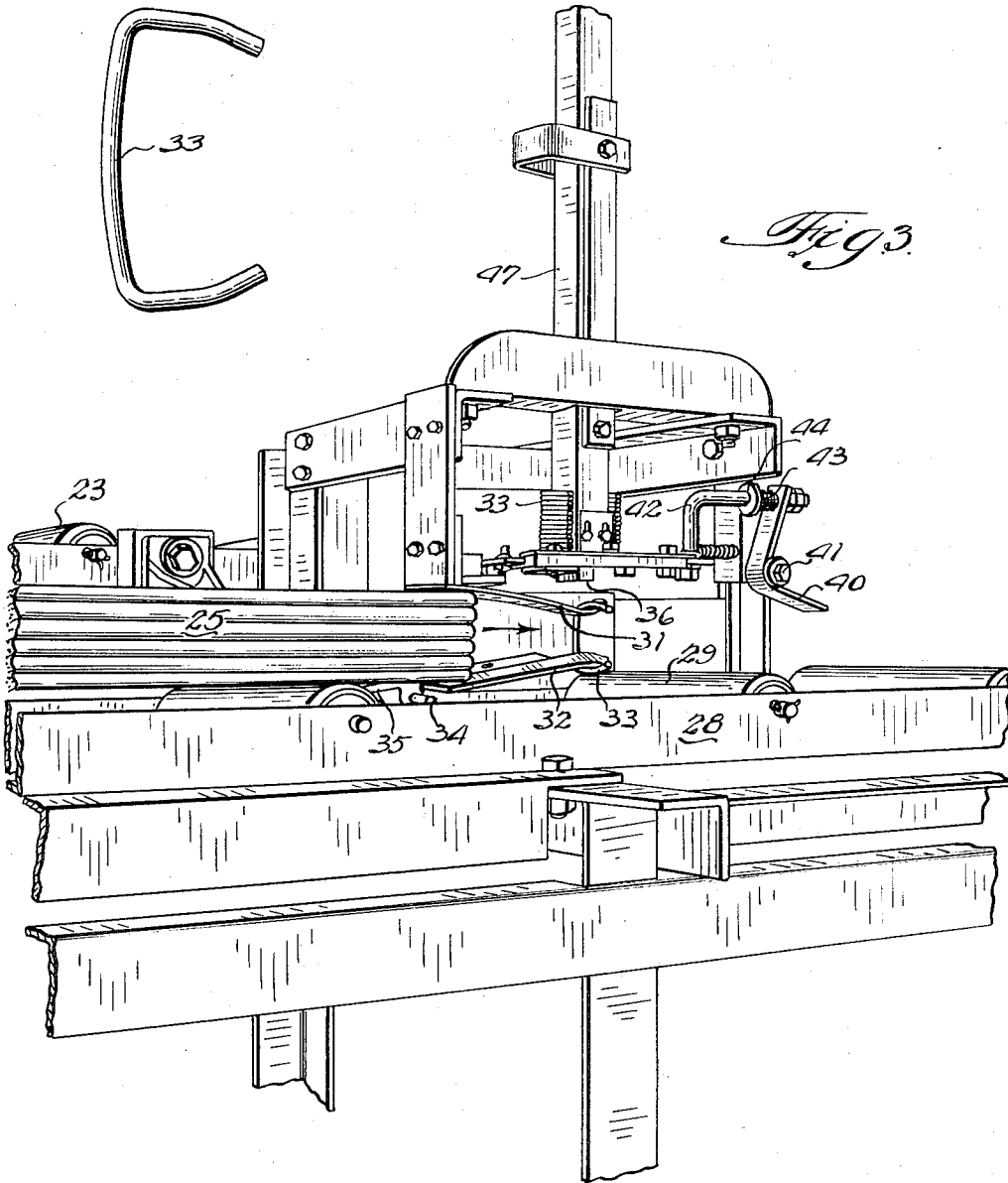


Fig. 3.



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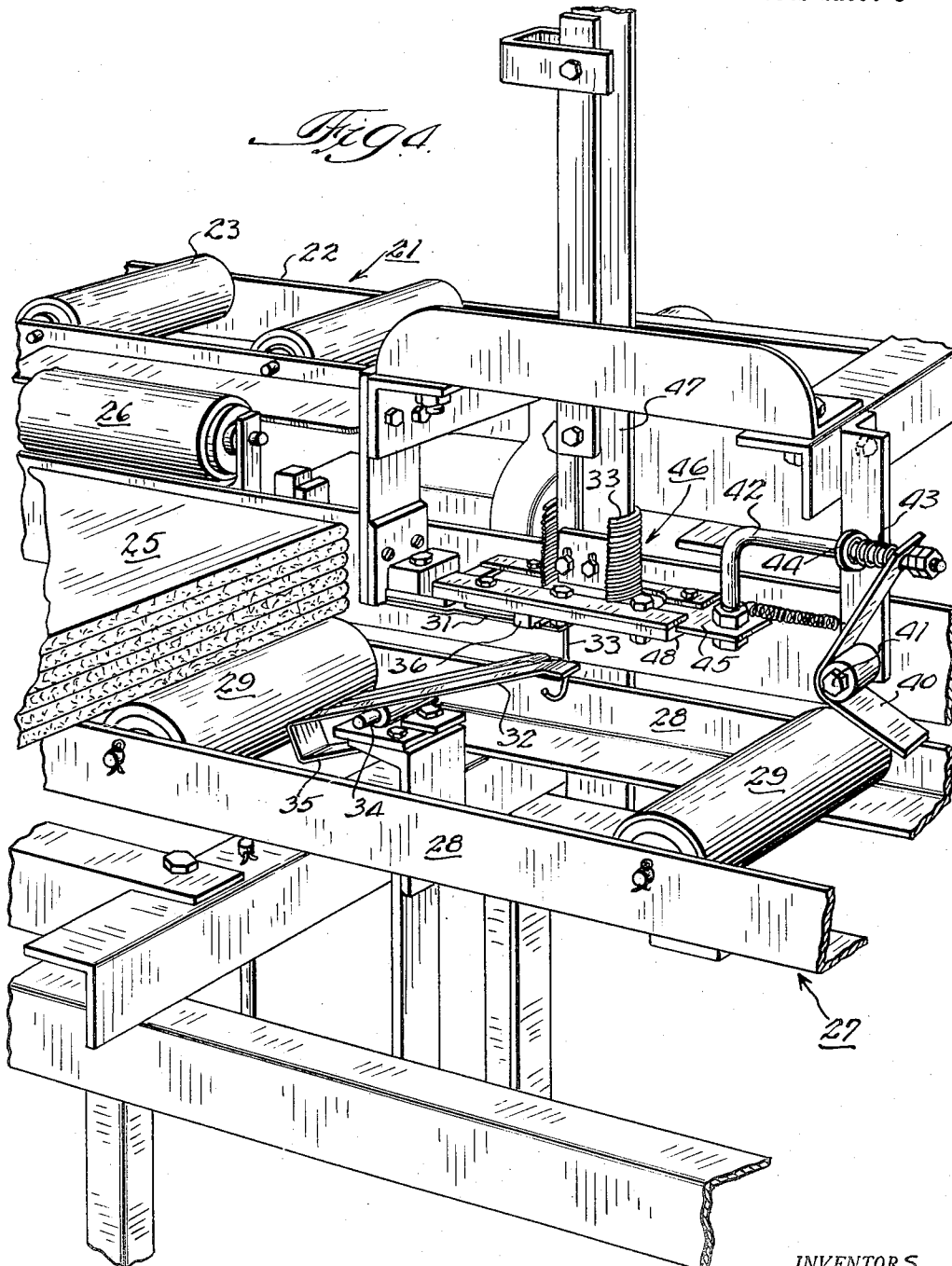
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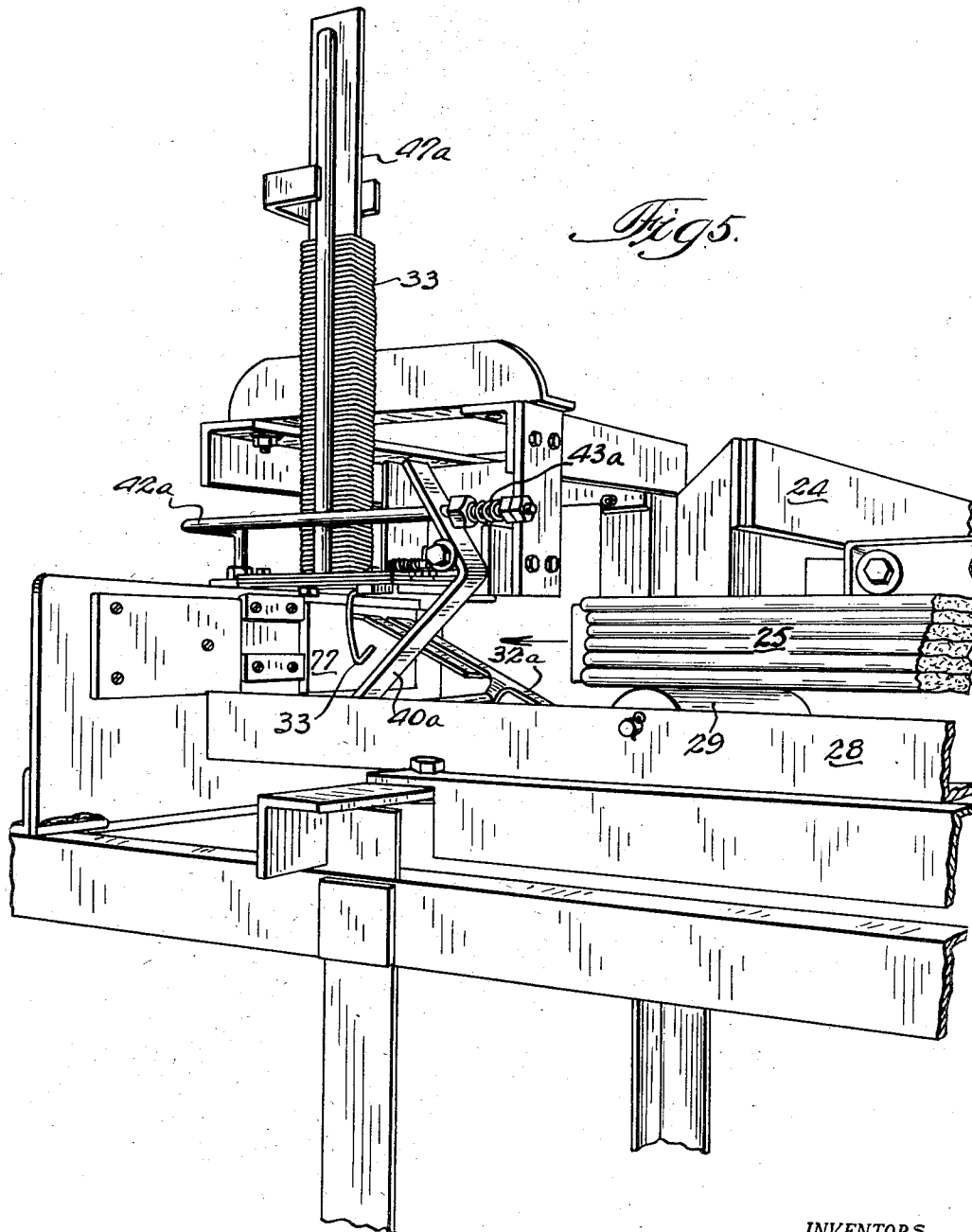


Fig. 5.

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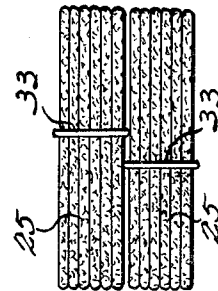
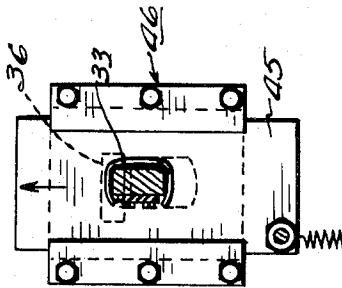
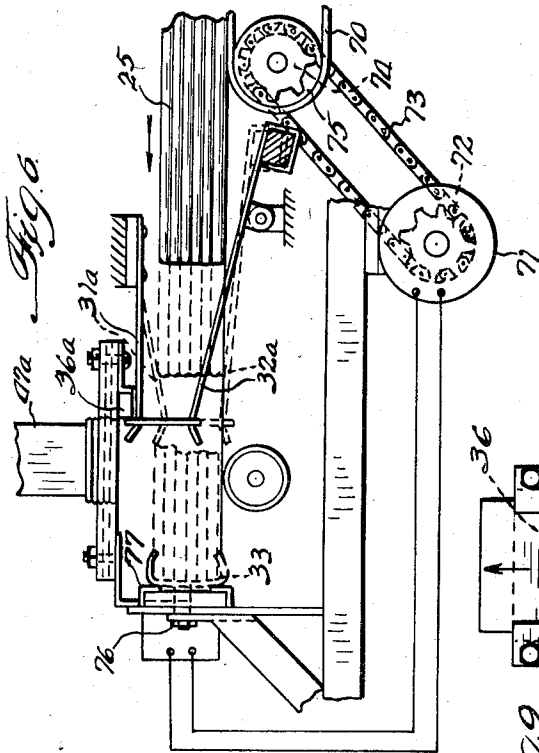
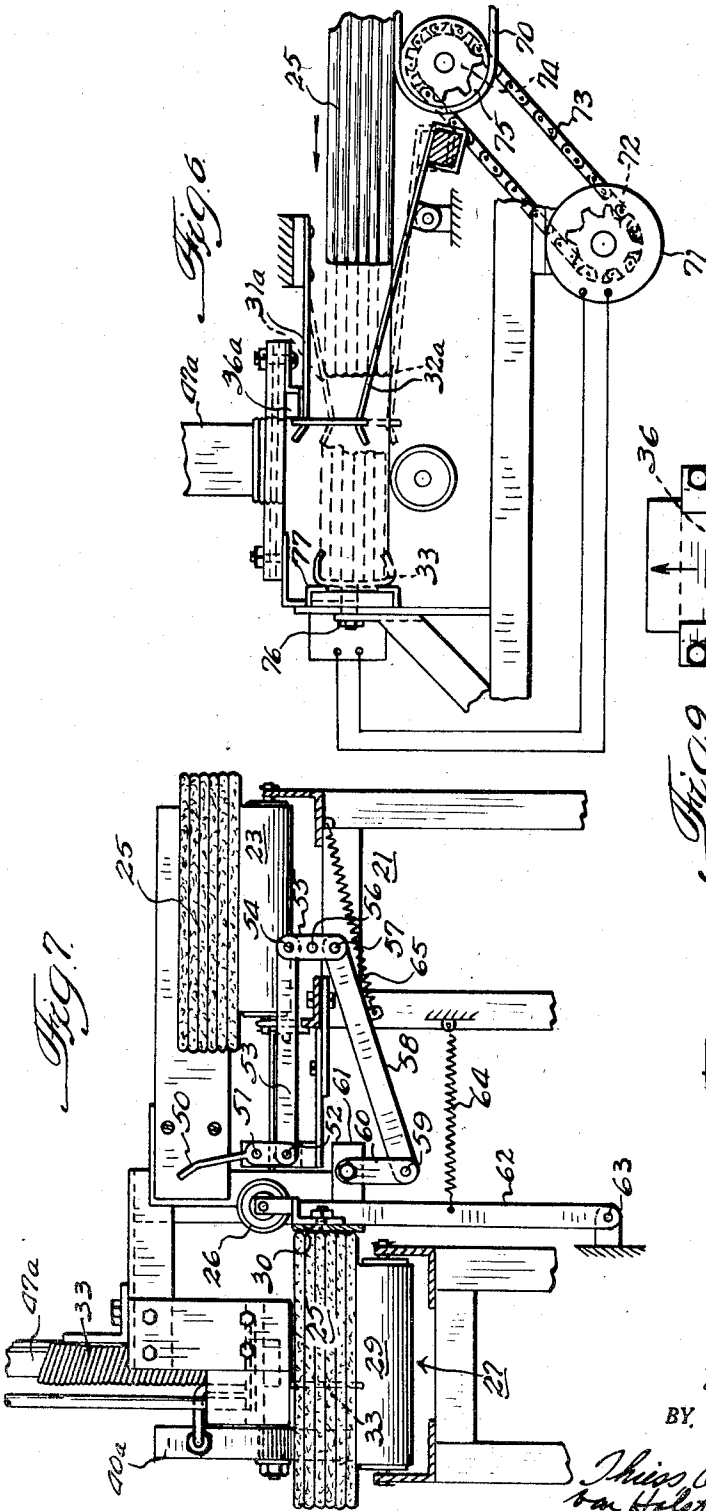


Fig. 1.

Fig. 2.

Fig. 3.

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BUNDLE CLIPPING MACHINE

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Application November 18, 1954, Serial No. 469,684

7 Claims. (Cl. 29—208)

This invention relates to a bundle clipping machine, and it is an object of the invention to provide improved apparatus of that character.

The machine disclosed and claimed herein is an improvement over the machine disclosed and claimed in application Serial No. 93,106, entitled Bundle Clipping Machine, filed May 13, 1949, by John Page, now Patent No. 2,707,818, granted May 10, 1955 and assigned to the same assignee as the present application. In this patent, a bundle clipping machine is disclosed in which clip spreaders are movable toward and away from a bundle, the clip spreaders carrying the clip forward into bundle clipping position and then retreating to pick up another clip. In one embodiment of the present application clip spreaders are provided which remain generally stationary, the bundles being successively moved between the spreaders to pick up the clips associated therewith.

Accordingly, it is another object of the invention to provide an improved bundle clipping machine in which clip spreaders are provided which are generally stationary and in which bundles are moved to the clip spreaders.

It is another object of the invention to provide an improved bundle clipping machine having a shuttle for passing clips seriatim to clip spreaders.

It is another object of the invention to provide an improved bundle clipping machine in which vertically spaced clip spreaders are arranged to receive successive clips which may be dropped onto the upper clip spreader by a shuttle or other device for feeding clips seriatim.

It is another object of the invention to provide an improved bundle clipping machine having one or more of the above specified features while being simple in construction, inexpensive, durable and efficient.

This invention, together with further objects and advantages thereof, will best be understood by reference to the following description taken in connection with the accompanying drawings, and its scope will be pointed out in the appended claims.

In the drawings, in which like parts are designated by like reference numerals,

Figure 1 is a perspective view of an entire machine illustrating one embodiment of the invention;

Fig. 2 is a full size view of one form of clip which may be handled by the machine of Fig. 1;

Fig. 3 is an enlarged perspective view of the right-hand portion of the machine shown in Fig. 1;

Fig. 4 is a still further enlarged perspective view of the right-hand portion of the machine of Fig. 1;

Fig. 5 is an enlarged perspective view of the left-hand end of the machine of Fig. 1;

Fig. 6 is an elevational view illustrating a portion of the apparatus of Fig. 5;

Fig. 7 is a cross-sectional view taken across the middle of the machine illustrated in Fig. 1;

Fig. 8 is a sketch illustrating the arrangement of clips on successive bundles handled by the machine of Fig. 1; and

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Fig. 9 is a cross-sectional plan view of certain shuttle apparatus included in the machine of Fig. 1.

The bundle clipping machine shown in the drawings and described below is shown adapted to the application of wire clips to bundles consisting of several sheets of plasterboard. It is to be understood, however, that the invention herein disclosed and claimed can readily be embodied in a machine for applying spring clips to various forms of bundles. It is to be understood further that where the term "plasterboard" is used herein it is intended to be construed broadly, to include any form of gypsum filled, paper covered sheet material or the like.

In Fig. 1 there is shown at the back of the machine a track generally designated 21 having side rails 22 and rollers 23 for conveying bundles of plasterboard to the machine. Preferably, the plasterboard as fed to the machine is already stacked. A strike plate 24 is provided against which successive stacks or bundles of plasterboard may strike to stop the movement of the bundles and to realign the boards one with respect to the others.

In the particular embodiment of the invention illustrated in the drawings, a stack of plasterboard 25, after reaching the strike plate 24, is manually removed from the track 21 by sliding it forwardly over the rollers 26 and onto a track 27. This track also may comprise side rails 28 and rollers 29. After the bundle 25 has been dropped onto the track 27 it may be pushed back against a strike plate 30 to realign the boards laterally of each other, and to position the bundle.

The bundle 25 is now in position for manual or automatic movement, first to the left in Fig. 1 and then to the right along the track 27 to pick up clips at opposite ends thereof. In Fig. 1 the illustrated bundle 25 is shown progressing to the right between an upper spreader 31 and a lower spreader 32, a wire clip 33 being shown supported by the spreaders in position to be picked up by the right-hand end of the bundle 25. In Fig. 4 the spreaders are shown in their normal positions. The lower spreader 32 may be seen to be pivotally mounted at 34. This spreader extends to the left beyond the pivotal mounting 34 to form a counterbalance portion 35 which tends to pivot the spreader in a counterclockwise direction as viewed in Fig. 4.

The upper spreader 31 is formed of spring material and is secured at its left-hand end to the frame of the machine. In its normal position the upper spreader extends substantially horizontally and bears against a stop 36, best seen in Figs. 3 and 4.

When the two spreaders 31 and 32 are in their normal positions, that is, the upper spreader extending horizontally and the lower spreader being pivoted upwardly, as shown in Fig. 4, the clip-receiving or right-hand ends thereof are sufficiently close together that an undeformed wire clip 33 hanging from the upper spreader 31 readily extends down below the lower spreader 32. When the bundle 25 is moved between the two spreaders, the bundle pivots the lower spreader 32 downwardly to substantially a horizontal position. During this movement the lower spreader engages the lower leg of the clip 33 and, acting through the clip, draws the upper spreader 31 downwardly. Further movement of the bundle 25 between the two spreaders wedges the spreaders apart whereby they spread the legs of the clip such that they may ride onto opposed surfaces of the bundle.

As the bundle moves still farther, the forward end of the bundle engages the bail of the clip 33 and pulls the clip away from the spreaders, the two legs of the clip then directly engaging opposed surfaces of the bundle.

In the particular embodiment of the invention illustrated in the drawings, the clip 33 as deposited on the spreaders lies in a plane extending perpendicular to the direction

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of movement of the bundle. More specifically, the legs of the clip 33 extend toward the front of the machine when deposited on the spreaders, as may best be seen in Fig. 3. When the advancing bundle engages the bail of the clip, the bail is of course advanced to the right by the bundle while the legs, being in engagement with the spreaders, lag behind. This action turns the clip through an angle of 90°, whereby the legs of the clip ultimately extend to the left or inwardly of the advancing surface of the bundle. As may best be seen in Fig. 3, the tips of the spreaders 31 and 32 are turned out away from each other. These tips restrain the legs of the clips as the moving bundles force the clips away from the spreaders. This assures rotation of the plane of the clips such that the clips engage the bundles squarely.

As soon as the clip has been withdrawn from the spreaders, the upper spreader 31 springs back to its normal, horizontal position. When the bundle has completely passed by the spreaders, the lower spreader 32 is free to pivot in a counterclockwise direction under the influence of the counterweight 35. The spreaders are then in position to receive another clip 33.

According to the preferred embodiment of the invention the successive application of clips to the spreaders is automatic. In Fig. 4 a bell crank 40 is shown pivotally mounted at 41 on the frame of the machine. When a bundle 25 passes under the bell crank along the track 27 it strikes the lower leg of the bell crank and pivots the bell crank in a counterclockwise direction, the lower leg of the bell crank riding along the upper surface of the bundle.

The upwardly extending leg of the bell crank is resiliently connected to an arm 42 through a spring 43 and a collar 44 which is secured to the arm 42. The arm 42 is in turn rigidly connected to the operating plate 45 of shuttle apparatus 46 which serves to feed clips seriatim to the spreaders 31 and 32.

The shuttle apparatus 46 may be of any suitable form, and since the actual construction of the shuttle does not in itself constitute a feature of the invention, it is described only briefly herein. The shuttle apparatus shown includes a post 47 which holds a supply of clips 33 in vertical alignment. The post 47 terminates immediately above the operating plate 45 of the shuttle apparatus such that a clip 33 cannot escape between the operating plate 45 and the bottom of the post 47. The plate 45 has an opening therein for receiving successive clips 33, the thickness of the plate 45 being approximately the same as the thickness of one clip. Accordingly, when the plate 45 is moved to the left in Fig. 4, a single clip can drop down into the opening in the plate 45.

Arranged below the plate 45 is a stationary plate 48 also having an opening through which a clip may pass. When the operating plate 45 moves back to the right the clip which has dropped into the opening in the operating plate is brought into alignment with the opening in the stationary plate whereby the clip is free to fall through the stationary plate. The left-hand end of the clip, as viewed in Fig. 4, engages the upper spreader 31, as previously described, whereupon the clip swings down to a vertical position wherein the lower leg of the clip hangs immediately below the lower spreader 32.

In accordance with the preferred embodiment of the invention, the stop 36, previously described, is magnetized. The magnet attraction of the stop 36 for the upper leg of the clip 33 helps to retain the clips in proper position. More specifically, the magnetic attraction serves to maintain the upper leg of the clip in position and dampens the swinging of the clip.

It will be appreciated that the shuttle apparatus may alternatively be so constructed that the opening in the operating plate 45 is positioned to receive a clip when the operating plate is to the right in Fig. 4. In this case the clip so received by the operating plate 45 is brought

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into alignment with the opening in the stationary plate 48 when the operating plate is moved to the left.

The spreaders, the shuttle apparatus, and the shuttle control means have so far been described for the right-hand end of the machine. The same apparatus at the left-hand end of the machine, best seen in Fig. 5, may be substantially identical. Accordingly, corresponding apparatus at the left-hand end of the machine is identified by the same reference numerals followed by the letter *a*. It will readily be understood that the lower spreader 32*a* and the bell crank 40*a* at the left-hand end of the machine return to their normal positions when the successive bundles are withdrawn to the right after receiving a clip. It should also be noted that the outward curvature of the tips of the spreaders 31*a* and 32*a* prevents the spreaders from engaging the ends of the deposited clips when the successive bundles are withdrawn from between the spreaders.

As has previously been described, a bundle 25, after being moved onto the track 27, may be pushed back against the stop plate 30 to align the sheets of plasterboard included in the bundle. However, it is desirable that the clips applied to successive bundles be arranged at different points across the ends of the bundles, since the successive bundles may subsequently be stacked one on top of the other. In Fig. 8 two bundles are shown stacked one on top of the other and the clips 33 are shown staggered. If the clips were aligned they would strike one against the other, with the possibility that they would become entangled or loosened. Furthermore, substantial alignment of the clips would result in a relatively unstable stack of bundles. It is preferred, therefore, that the clips be staggered as shown in Fig. 8.

For this purpose the stop plate 30 is automatically repositioned for each successive bundle in the preferred embodiment of the machine. As may be seen in Fig. 7, a finger 50 lies in the path of the bundles 25 as they are removed from the track 21 and brought down to the track 27. This finger is pivotable about an axis 51 and is pivotally connected at 52 to a link 53. The link 53 is in turn pivotally connected at 54 to a bar 55 which pivots about an axis 56.

The lower end of the bar 55 is pivotally connected at 57 to another link 58, and the link 58 is pivotally connected at 59 to an arm 60. The arm 60 operates a rectangular cam 61 through a ratchet mechanism, not shown in the drawings.

Referring now to the stop plate 30 in Fig. 7, it may be seen to be mounted on arms 62 which are pivotally mounted at 63 on the frame of the machine. Preferably, there are at least two arms 62 for supporting the stop plate 30, and the cam 61 is arranged to engage the rearward side of two such arms. It will be noted that a spring 64 is provided for urging the arms 62 and, hence, the stop plate 30 rearwardly or to the right in Fig. 7. A spring 65 is also provided for urging the link 58 to the right. This of course urges the link 53 to the left and the finger 50 to the right.

When a bundle 25 is moved from the track 21 to track 27 it pivots the finger 50 in a counterclockwise direction. This moves the link 53 to the right, the link 58 to the left, and causes rotation of the cam 61 through an angle of 90°. After passage of the bundle 25 the spring 65 returns the links 58 and 63 and the arm 50 to their normal positions shown in Fig. 7. When the next bundle 25 is moved from the track 21 to the track 27, the same operation occurs with the result that the cam 61 is again turned through an angle of 90°.

It will now be apparent that when the cam 61 is in the position illustrated in Fig. 7, the stop plate 30 will be in the position shown. When the cam is rotated through an angle of 90°, the stop plate 30 will be drawn by the spring 64 to a position to the right of that shown in Fig. 7 since the cam 61 is eccentric. The stop plate 30, therefore, alternately moves to the right and to the left as

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each successive bundle 25 is moved from the track 21 to the track 27. Accordingly, when the successive bundles on the track 27 are pushed against the stop plate 30, they are differently aligned and the clips are applied to the successive bundles in different positions along the ends thereof.

As previously indicated, the movement of the bundles may be obtained manually. However, the invention is well adapted to automatic moving of the bundles, and in Fig. 6 there is shown basic apparatus which would permit automatic moving of the bundles once they are deposited on the track 27. An endless belt 70 is provided for supporting the bundles 25, which belt may, if desired, ride over the rollers 29 shown in Fig. 1. The belt 70 may be driven by a motor 71 through a sprocket 72, a chain 73, another sprocket 74, and a roller 75.

Control apparatus including a switch 76 is provided for determining the direction of rotation of the motor 71 and, hence, the direction of movement of the belt 70. The motor 71 may, for example, drive the belt 70 to carry the bundles 25 first to the left, in Fig. 6, to pick up a clip at the left-hand end thereof. When the bundle strikes a stop plate 77, it also operates the switch 76 to cause reversal of the motor. The motor then drives the belt 70 to cause movement of the bundle to the right so that it may pick up a clip from the clip-applying apparatus at the other end of the machine, the bundle preferably being driven on through the spreaders at the other end of the machine.

Suitable limit switches or other types of control, sensitive to the passage of successive bundles off the belt 70, may then be employed for stopping the motor 71. Similarly, further control apparatus sensitive to the depositing of the next bundle 25 on the belt 70 may initiate operation of the motor to drive this next bundle to the left in Fig. 6.

Power apparatus and the controls therefor are shown only in part and have been described only briefly in order to illustrate that a machine constructed in accordance with the invention lends itself readily to automatic operation. Since the actual driving apparatus and the controls therefor do not, of themselves, constitute a part of the present invention they are not shown or described in detail herein. It is believed to be apparent that automatic, power-driven apparatus may also be provided for moving successive bundles from the track 21 to the track 27 and for driving the bundles against the stop plate 30.

It is believed to be readily apparent that the invention described above has many advantages over the prior art. One important factor results from the fact that the devices which hold the clips and guide them over the ends of the bundles are generally stationary. Because of this, the clip applying devices may be of very simple construction. It should be noted in this respect that in making the bundles move to the clip applying devices, no additional heavy apparatus is required since, in most applications, conveyor apparatus is furnished for the bundles in any event.

The arrangement of spreaders with a shuttle clip-feeder directly thereabove produces an automatically reloading, clip applying device which can be constructed for a fraction of the cost of comparable machines in the prior art.

The stop means 30 for aligning successive bundles differently with respect to the clip applying devices is automatic in operation while also being of very simple and reliable construction.

While particular embodiments of the invention have been shown, it will be understood, of course, that the invention is not limited thereto since many modifications may be made, and it is, therefore, contemplated to cover by the appended claims any such modifications as fall within the true spirit and scope of the invention.

The invention having thus been described, what is claimed and desired to be secured by Letters Patent is:

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1. A machine for applying substantially U-shaped, resilient clips to the edge of a moving bundle, the distance between the free ends of each clip, when the latter is in an unstressed condition, being less than the bundle edge thickness, said machine comprising, a pair of spreader elements arranged one above the other and adjustable into engagement with the ends of clips and for guiding the engaged ends of said clips onto opposed surfaces of the bundle edge which is moved between said spreader elements, said spreader elements being movable vertically relative to each other to permit passage of the bundle edge therebetween and to spread said clips, said spreader elements normally being urged toward each other to positions in which the ends of an unstressed clip may be engaged thereby, and a shuttle for passing individual clips seriatim, said shuttle being arranged above and in juxtaposition to the uppermost of said spreader elements whereby one end of each successive clip passed by said shuttle contacts the uppermost surface of said upper spreader element and the other end of such clip is free to swing about the contacted clip end as an axis to a substantially vertical plane whereby said lowermost spreader element is positioned in spaced relation above the free end of the suspended clip.

2. A machine for applying substantially U-shaped, resilient clips to the edge of a moving bundle, said machine comprising a pair of spreader elements arranged one above the other for engaging the ends of clips and for guiding the ends of said clips onto opposed surfaces of the bundle edge which is moved between said spreader elements, said spreader elements being movable vertically relative to each other to permit passage of said bundle edge therebetween and to spread said clips, said spreader elements normally being urged toward each other to positions in which the ends of an undeformed clip may be engaged thereby, a shuttle for passing individual clips seriatim, said shuttle being arranged above said spreader elements whereby successive clips passed by said shuttle may drop into engagement with said spreaders, said clips as dropped into engagement with said spreader elements lying in a plane substantially perpendicular to the direction of bundle edge movement between said spreader elements, and means carried by said spreader elements releasably restraining the ends of said clips against movement in the direction of bundle edge movement, whereby engagement of a moving bundle edge with the bail of a clip may turn said clip into a plane substantially parallel to the direction of movement of said bundle edge.

3. A machine for applying substantially U-shaped resilient clips to the edge of a moving bundle, said machine comprising a first pair of spreader elements arranged one above the other for engaging the ends of clips and for guiding the ends of said clips onto opposed surfaces of the bundle edge which is moved between said spreader elements, said spreader elements being movable vertically relative to each other to permit passage of said bundle edge therebetween and to spread said clips, said spreader elements normally being urged toward each other to positions in which an unstressed clip may be engaged thereby, a second pair of like spreader elements spaced from said first pair and arranged in the same general level, and a platform for supporting a bundle intermediate said pairs of spreaders, said platform disposed in said general level and being constructed to facilitate movement of said bundle in two opposed directions toward and away from said pairs of spreader elements, whereby said bundle may readily be moved first between one of said pairs of spreader elements to effect application of a clip on one portion of the bundle edge and subsequently between the other of said pairs of spreader elements to effect application of a second clip on a second portion of the bundle edge.

4. A machine for applying substantially U-shaped resilient clips to the edge of a moving bundle the distance between the free end of each clip, when the latter is in

an unstressed condition, being less than the bundle edge thickness, said machine comprising a pair of relatively spaced clip-spreading elements mounted in a substantially vertical plane for relative movement to effect spreading of the clip free ends and positioning the spread clip into encompassing relation with the bundle edge, bundle-supporting means disposed adjacent said elements to effect movement of a supported bundle relative to said spreader elements into a position intermediate said elements, said elements being engageable by the bundle edge and responsive to the supported-bundle movement and actuated thereby into a clip-spreading position whereby the distance between the clip free ends is greater than the bundle edge thickness, clip-storage means disposed above the uppermost spreader element, actuatable clip-feed means disposed intermediate said storage means and said uppermost spreader element and cooperating with same to effect successive feeding of clips into engagement with said uppermost spreader element while said spreader elements are in a non-spreading clip position, whereby the fed clip is disposed in a plane substantially transverse to the direction of bundle movement, and control means operatively connected to said feed means to effect controlled actuation thereof; said control means being engageable by the bundle edge and responsive to the bundle movement subsequent to actuation of said spreader elements.

5. The machine, recited in claim 4, including magnetic clip-attracting means disposed adjacent to said uppermost spreader element and cooperating with the latter to retain a fed clip in position with respect to said uppermost spreader element.

6. A machine for applying substantially U-shaped resilient clips to the edge of a moving bundle, the distance between the free ends of each clip, when the latter is in an unstressed condition, being less than the bundle edge thickness, said machine comprising a pair of relatively spaced clip-spreading elements mounted in a substantially vertical plane for relative movement to effect spreading of the clip free ends and positioning the spread clip into encompassing relation with the bundle edge, bundle-supporting means disposed adjacent said elements to effect movement of a supported bundle relative to said spreader elements into a position intermediate said elements, said elements being engageable by the bundle edge and responsive to the supported-bundle movement and actuated thereby into a clip-spreading position whereby the distance between the clip ends is greater than the bundle edge thickness, bundle guide means adjustably mounted adjacent said bundle-supporting means and cooperating therewith to control the direction of bundle movement relative to said spreader elements, clip-storage means disposed above the uppermost spreader element, actuatable clip-feed means disposed intermediate said storage means and said uppermost spreader element and cooperating with same to effect successive feeding of clips into engagement with said uppermost spreader element, while said spreader elements are in a non-spreading clip position, whereby the fed clip is disposed in a plane substantially transverse to the direction of the guided bundle movement, and control means operatively connected

to said feed means to effect controlled actuation thereof; said control means being engageable by the bundle edge and responsive to the guided bundle movement subsequent to actuation of said spreader elements.

7. A machine for applying substantially U-shaped resilient clips to the edge of a moving bundle, the distance between the free ends of each clip, when the latter is in an unstressed condition, being less than the bundle edge thickness, said machine comprising a pair of relatively spaced clip-spreading elements for contacting the free ends of a clip, said elements being mounted in a substantially vertical plane for relative movement to effect spreading of the contacted clip free ends and positioning the spread clip into encompassing relation with the bundle edge, substantially horizontal bundle-supporting means disposed adjacent said elements to effect movement of a supported bundle relative to said spreader elements into a position intermediate said elements, said elements being engageable by the bundle edge and responsive to the supported bundle movement and actuated thereby into a clip-spreading position whereby the distance between the contacted clip free ends is greater than the bundle edge thickness, adjustable bundle guide means mounted adjacent said bundle-supporting means for movement in a substantially horizontal plane transverse to the direction of bundle movement, and to vary the relative position of the slip to be applied to the bundle edge, said guide means being automatically adjusted to a changed position of the clip to be applied to the bundle edge, said successive bundle positioned on said bundle-supporting means, clip-storage means disposed above the uppermost spreader element, actuatable clip-feed means disposed intermediate said storage means and said uppermost spreader element and cooperating with same to effect successive feeding of clips into engagement with said uppermost spreader element, while said spreader elements are in a non-spreading clip position, whereby the fed clip has one free end thereof in contact with said uppermost spreader element and assumes a suspended substantially vertical position with the open side of the U-shaped clip disposed adjacent the bundle-supporting means, and control means operatively connected to said feed means and spaced from said spreader elements to effect controlled actuation of said feed means subsequent to the bundle edge moving from between said spreader elements.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,862,289

December 2, 1958

Ragan M. Womack et al.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 6, line 39, for "spreaders" read -- spreader elements --;
column 8, line 27, for "slip" read -- clip --; line 29, for "of the clip to
be applied to the bundle edge, said" read -- relative to said bundle-
supporting means for each --.

Signed and sealed this 7th day of April 1959.

(SEAL)

Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents