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W. B. WHITE  
METHOD AND MEANS OF EXPELLING AIR FROM  
BETWEEN SUPERPOSED SHEETS OF MATERIAL  
Filed March 14, 1931

1,838,510

3 Sheets-Sheet 1

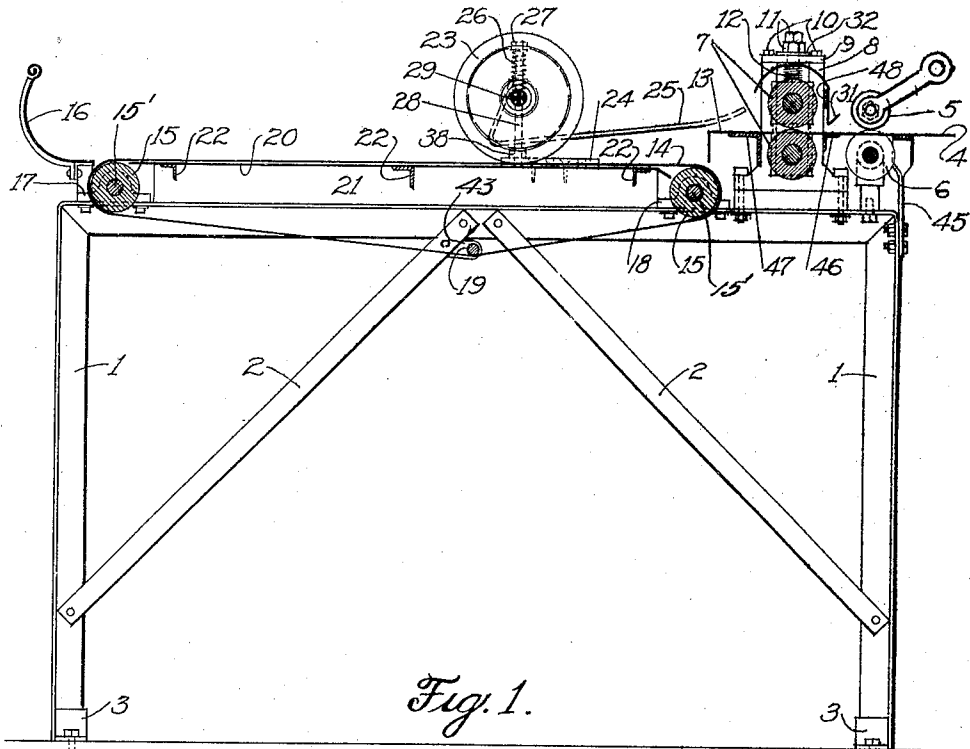


Fig. 1.

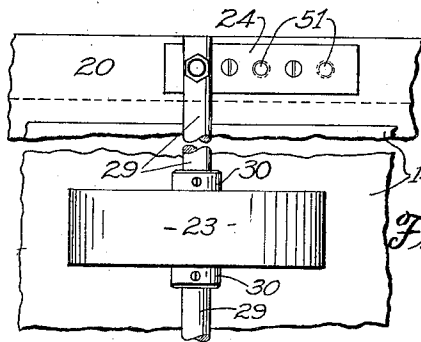


Fig. 2.

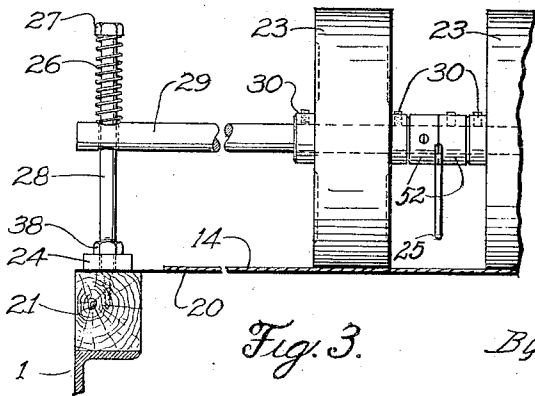


Fig. 3.

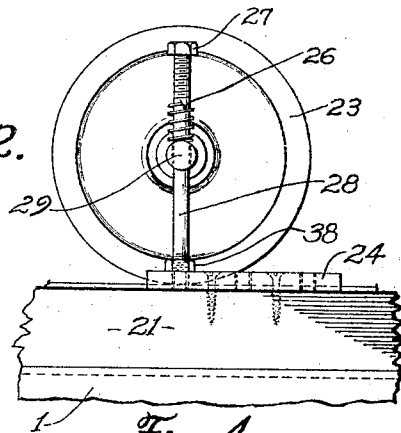


Fig. 4.

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3 Sheets-Sheet 2

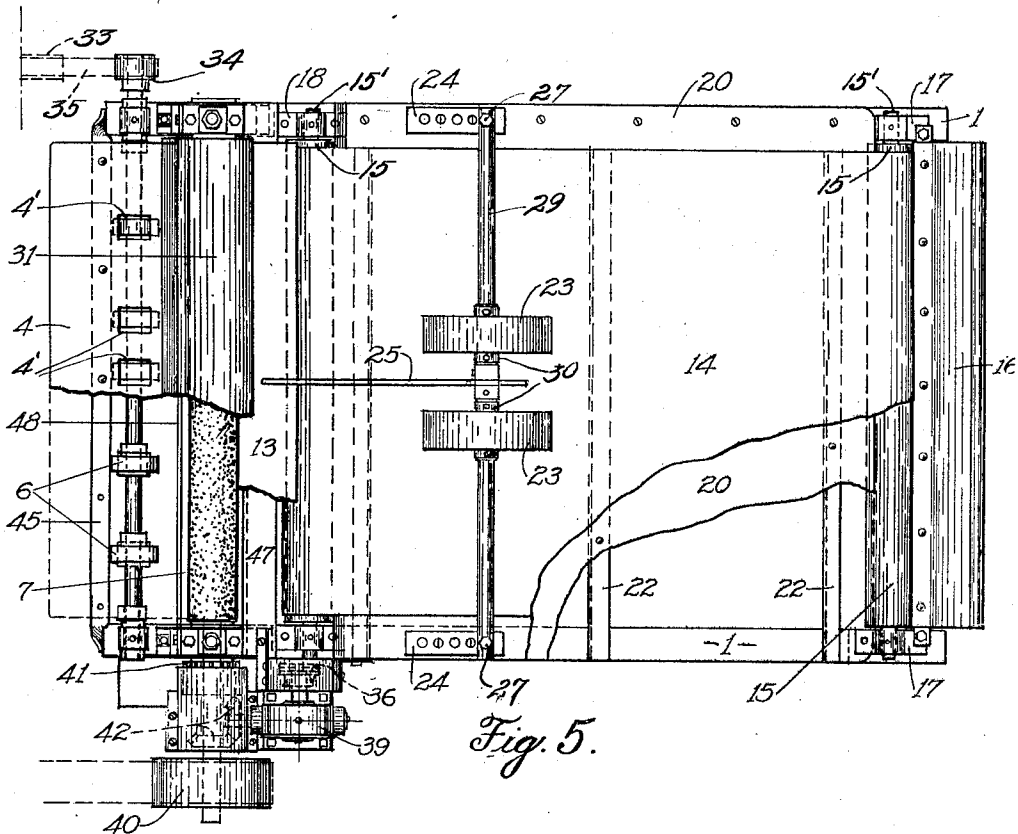


Fig. 5.

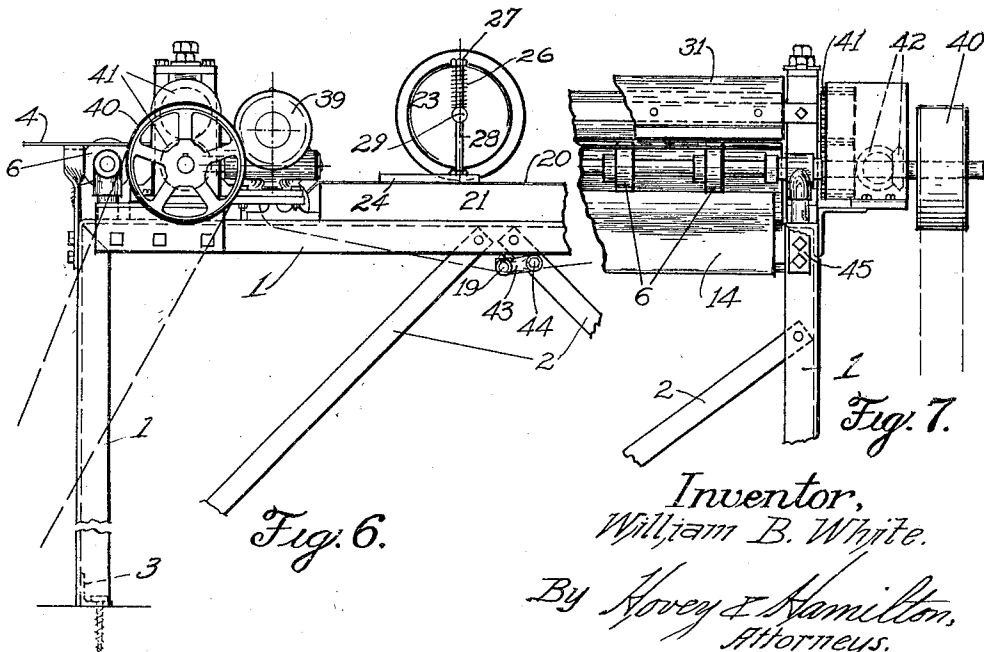


Fig. 6.

Fig. 7.

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## UNITED STATES PATENT OFFICE

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METHOD AND MEANS OF EXPELLING AIR FROM BETWEEN SUPERPOSED SHEETS OF  
MATERIAL

Application filed March 14, 1931. Serial No. 522,767.

The present invention relates to improvements in method and means of handling superposed sheets of material and has for a primary object, the provision of such an apparatus which will completely, quickly and effectively express the air from between such sheets, to smooth out the same and to deliver the treated packet of superposed sheets to a point where they are conveniently handled and transferred to the trimming or other equipment which is to act upon the same.

Another object of this invention is to provide a machine for flattening a stack of superposed sheets of material by whipping the air from between said sheets, dropping the packet of sheets to a conveyor belt and then rolling the same out smoothly, whereby the packet is in such neat and closely compressed form that trimming, binding and subsequent handling for shipment is greatly facilitated.

An even further object of the instant invention is to provide a machine of the above mentioned character, wherein is incorporated novel and simple structure for accomplishing the preferred objects, such structure being readily usable in connection with handling sheets of varying sizes which are stacked in superposed relation and from which it is necessary to express the air before the packet of sheets is acted upon to prepare the same for delivery and actual use. The preferred form of the invention and but one embodiment thereof is shown in the accompanying drawings, wherein:

Figure 1 is a vertical, central, sectional view through the machine at the approximate center thereof.

Fig. 2 is a fragmentary plan view of one of the smoothing rollers and means for effecting its adjustment.

Fig. 3 is an edge view of the same.

Fig. 4 is a fragmentary side elevation of a portion of the machine, showing particularly the smoothing roller and its mounting.

Fig. 5 is a top plan view of the entire machine, parts being broken away for clearness.

Fig. 6 is a fragmentary side elevation of the receiving end of the machine, showing par-

ticularly the driving mechanism for the compression rollers.

Fig. 7 is a fragmentary end elevation of the same assembly illustrated in Fig. 6, parts being broken away to reveal relative position of certain elements, and,

Fig. 8 is a perspective view of the feed-in end of the machine, on an enlarged scale, and condensed transversely, illustrating the relation of the more important parts of the mechanism.

In describing the operation and component parts of the machine, like reference characters will be used to designate similar parts throughout the several views, and the numeral 1 indicates the supporting framework which may position and maintain the machine in a proper relation to a pin, or other machine not here shown, said framework being provided with necessary bracing 2 and means for anchoring the entire assembly to the floor or foundation, which might consist of angle clips 3.

The material acted upon by this machine usually consists of packets or stacks of superposed sheet material which is delivered on to table 4 and above rollers 6, which are turned through the intermediacy of pulleys 33 and 34 and belt 35, passing thereover.

Idler wheels 5, hung from any suitable support, not here shown, maintain the sheets against rollers 6 with sufficient pressure to set up conveying friction to move the material between compression rollers 7, mounted to receive material from table 4 as it is moved therealong. Rollers 6 extend slightly above the surface of table 4 through openings 4' formed therethrough for such purpose. Compression rollers 7 are rotated at a high rate of speed and as soon as the material engages the periphery thereof, the same is snatched quickly and violently, causing a vibrating motion, literally shaking the air from between the sheets of superposed material, which is then shot out onto receiving table 13 and onto moving conveyor belt 14, which is of the usual continuous construction, operatively supported by rollers 15 and idler rod 19. Receiving table 13 is on the same plane as table 4 and slightly below

the uppermost point of lower roller 7. Conveying portion of belt 14 is disposed on a horizontal plane substantially below that plane of receiving table 13 and at this point the packet of superposed sheet material, which has been compressed between rollers 7, is dropped a distance to further expel air from the packet.

After the material is carried by belt 14 toward the discharge end of the machine, it is acted upon by the comparatively large smoothing rollers 23. These rollers 23 are formed of wood or other light substance and ride lightly over the material with a slight pressure, secured by spring 26, mounted about the uppermost end of vertical rod 28. The pressure exerted is regulated by varying the tension of spring 26 through the adjustment of nut 27, carried on the uppermost end of rod 28.

After being engaged by smoothing rollers 23, the material being acted upon is conveyed by belt 14 to a catch-flange 16, where it is directed upwardly to a point where it may be readily removed by an attendant. The two rollers 15, supporting belt 14, are operated synchronously with the compression rollers 7 through the use of sprockets or similar mechanism 36 and chain 37, but at a slower speed, obtained through any well known speed reducing equipment 39, positioned as illustrated in Figs. 5 and 6. Power to operate compression rollers 7 and belt rollers 15 is supplied from any suitable source and applied through pulley wheel 40, which actuates the mitre gears 42 and spur gears 41. This power transmitting apparatus illustrated and described may be altered as desired, so long as the speed of compression rollers 7 is comparatively high with respect to the speed of rollers 15. Belt 14 travels over a sheet metal table 20, rigidly supported by transverse angle irons 22, let into the wooden members 21, on each side of the machine. These members 21 are supported by frame 1 and are interposed between frame 1 and table 20 as a convenient interconnecting means. The shafts 15' of each roller 15 respectively are mounted in bearing blocks 17 and 18, of which the pair marked 17 may be adjustable on the frame for the purpose of varying the tension of belt 14.

Catch-flange 16 is mounted on bearing blocks 17 so that it is automatically adjusted and mounted in proper position with relation to the discharge end of belt 14 when any adjustment is made in the position of rollers 15, supported by bearings 17. Bearing blocks 18, supporting roller 15 below and adjacent receiving table 13, are rigidly fixed to frame 1, but may be made adjustable in the event it is considered desirable.

A take-up rod 19, shown in Figs. 1 and 6, acts upon belt 14 to maintain the conveyor portion thereof in a taut condition.

This rod 19 may be carried by movable arm 43, mounted on brace member 2 by a tightening bolt 44, which is loosened when it is desired to swing arm 43 to a predetermined position. Tables 4 and 13 are supported by brackets 45 and two transverse angle iron members 46 and 47, all of which give substantial support as a result of their rigid attachment to frame 1. Depending sheet-metal shield 31, supported by bearing 48, extends the full length of rollers 7 to serve as a safety guard and to prevent lint and dust incident to the operation from being deflected upwardly or outwardly. The distance between the lowermost edge of shield 31 and table 4 must not be less than the maximum thickness of a packet of superposed sheets which are to be passed between compression rollers 7.

With particular reference at this time to Figs. 2, 3, 4 and 8, wherein is shown the novel parts of the machine, so far as the second step in the handling of material is concerned, Fig. 8 clearly shows the mountings of rollers 7 and means for operating the driven roller 15 which moves belt 14. Rollers 7 are preferably provided with roughened, annular faces to insure a firm grip on the material passing therebetween. Bearings 49, supporting rollers 7, are of high-friction resisting material and are formed to provide a groove which engages pillow block 8, whereby they may slide vertically. A blank 50, similarly grooved, is interposed between bearings 49 and is of a thickness proper to fix the minimum distance that rollers 7 shall be apart as material passes therebetween. Unevenness, bulging, or greater thickness in the material passing between rollers 7 is taken up by springs 12, interposed between headpiece 9 and bearing 49 of top roller 7.

The tension of these springs 12 is sufficient to exert pressure upon material passing between rollers 7 and to create the desired effect thereon, both as to the vibrating movement and the compression. Contact between upper bearing 49 and blank 50, as well as tension upon spring 12, may be secured by adjusting nuts 11. A thick leather washer 32, inserted under nuts 11, absorbs shock when upper roller is raised and allowed to snap back into position by a thick packet of superposed material. Headpiece 9 is secured to pillow block 8 by bolts 10, whereby headpiece 9 may be entirely removed from the operative position for the removal of upper bearing 49 when a blank 50 is desired to be positioned.

As above mentioned, when the material has passed between compression rollers 7, it is shot by the force of the same across receiving table 13 and caused to drop on to moving belt 14 and then conveyed under the large diameter, wide-faced, light-material rollers 23, more clearly shown in Figs. 2, 3

and 4. These rollers are adjustable axially and longitudinally; axial adjustment on their supporting shaft 29 is accomplished by means of set-screw hubs 30. The longitudinal adjustment is accomplished by moving vertical supporting rods 28 along bearing 24, provided with sockets 51 for the purpose. Sockets 51 are tapped and the end of rod 28 is threaded. A lock nut 38 is also carried by rod 28, which may be utilized to secure rod 28 against displacement after it has been positioned in the desired socket 51.

As illustrated in Figs. 2, 3 and 4, supporting shaft 29 rides vertically along rod 28 as material passes beneath smoothing rollers 23, which may be spaced apart by additional auxiliary hubs 52, carried by shaft 29. Rod 28 passes through an opening formed in shaft 29 to a point considerably thereabove, where nut 27 is placed to maintain a spring 26 in position between shaft 29 and nut 27.

The tension upon spring 26 is very slight, but may be increased by moving nut 27 thereagainst. This point is very advantageous and adjustment at this point allows completing a flattening of the material without further equipment.

In some instances, sheets of very light material have a tendency to blow out of the desired course of travel. In such cases, it is desirable to provide a plurality of guide bars 25, Figs. 1 and 5, which may be supported by shaft 29 through hubs 52. These guide bars extend from a free end overlying receiving table 13 to a point below shaft 29 and serve to direct the travel of material from the table to moving belt 14.

While the parts of a machine made in accordance with this invention have been described as being positioned in certain relation, it is to be understood that, in view of the adjustability built into the mechanism, a machine of this character might be constructed to handle superposed sheets of material of widely varying sizes. In any machine its use is limited only by the length of compression rollers 7, which will determine the size of material susceptible of being acted upon by the mechanism. It must be understood that such modifications as fairly fall within the scope of the appended claims and intent of the invention as disclosed herein might be properly followed without departing from the basic scope or concepts thereof in any manner whatsoever.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A machine of the character described comprising a pair of compression rollers; an endless conveyor belt; a table between said rollers and belt whereby to guide material from said rollers to the belt; and smoothing rollers associated with the belt to press the material as it is conveyed by the belt.

2. A machine of the character described comprising a pair of compression rollers; a receiving table adjacent the rollers; an endless conveyor belt disposed on a plane below the plane of said table; smoothing rollers associated with the belt to press material as it is conveyed by the belt from the rollers; and guide bars overlying said table and conveyor belt.

3. A machine of the character described comprising a pair of compression rollers; a receiving table adjacent the rollers; an endless conveyor belt disposed on a plane below the plane of said table; smoothing rollers associated with the belt to press material as it is conveyed by the belt from the rollers; and an arcuate catch-flange adjacent one end of said belt.

4. A machine of the character described comprising a pair of compression rollers; a receiving table adjacent the rollers; an endless conveyor belt disposed on a plane below the plane of said table; smoothing rollers associated with the belt to press material as it is conveyed by the belt from the rollers; a plurality of guide bars for directing material from the receiving table toward said belt; and an arcuate upwardly extending catch-flange adjacent the discharge end of said belt.

5. In a machine of the character described, an endless belt; a plurality of smoothing rollers associated with said belt to press against material being conveyed by the belt; and adjustable means exerting pressure upon said rollers to yieldably urge the same toward the

6. In a machine of the character described, an endless belt; a plurality of smoothing rollers associated with said belt to press against material being conveyed by the belt; and supporting apparatus for said rollers having means for adjusting the same axially and longitudinally.

7. In a machine of the character described, an endless conveyor belt; a plurality of smoothing rollers associated with said belt to press against material being conveyed by the belt; a pair of rollers supporting said belt; a pair of adjustable bearings for one of said rollers; and a catch-flange carried by said bearings.

8. The combination in a machine of the kind described, a conveyor belt; a pair of compression rollers adjacent one end of said belt; a catch-flange at the other end of said belt; a plurality of smoothing rollers intermediate said compression rollers and catch-flange; and means for adjusting said smoothing rollers to vary the distance between the same and said compression rollers and catch-flange.

9. In a machine for expressing air from between sheets of material, a conveyor belt; a pair of compression rollers; a plurality of smoothing rollers to press the material

against said belt subsequent to pressing between the compression rollers; and common means for driving said compression rollers and conveyor belt.

5 10. In a machine of the character described; a pair of compression rollers; a plurality of smoothing rollers; a conveyor belt all disposed to exert pressure upon sheets of superposed material, one of said compression  
10 rollers and said smoothing rollers each having yielding means for exerting said pressure; and means for varying the tension exerted by said yielding means.

15 11. The method of expelling air from between sheets of superposed material which consists in passing said material between high speed compression rollers; dropping the material through a distance; and passing the same beneath smoothing rollers having a  
20 comparatively low speed.

In testimony whereof, I hereunto affix my signature.

WILLIAM B. WHITE.

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