

Nov. 8, 1938.

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2,135,880

FOLDING MACHINE FOR FIBROUS MATERIAL

Filed Feb. 25, 1935

2 Sheets-Sheet 1

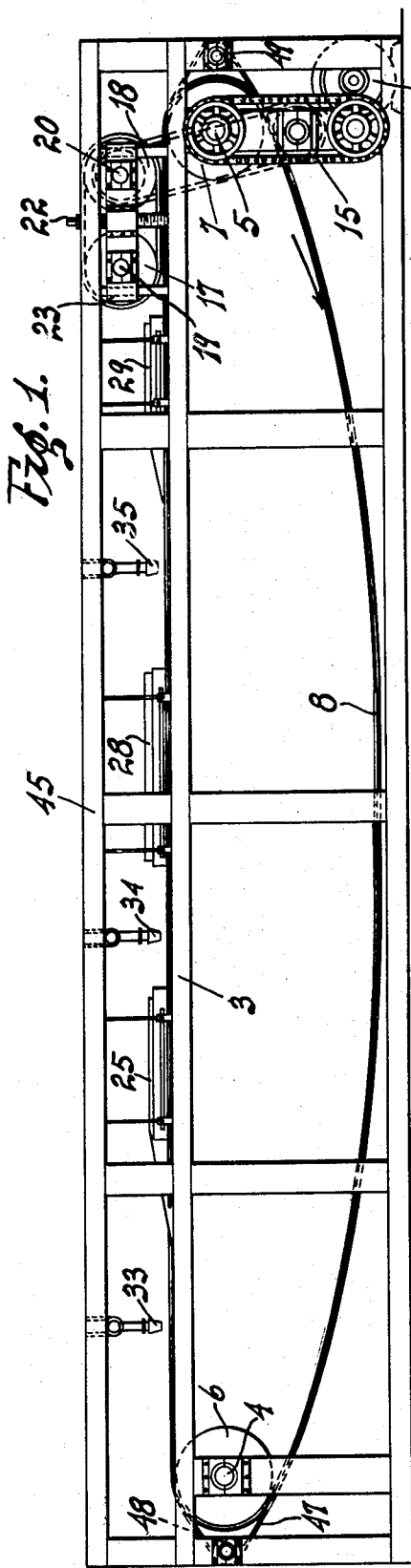


Fig. 2.

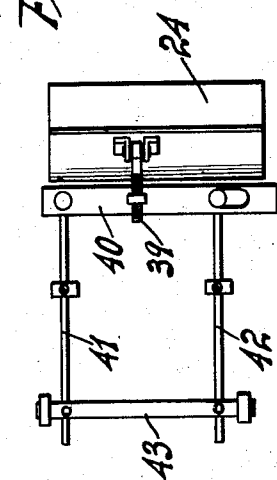


Fig. 3.

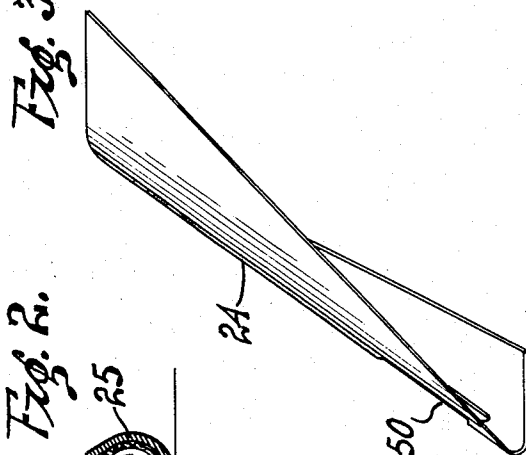


Fig. 4.

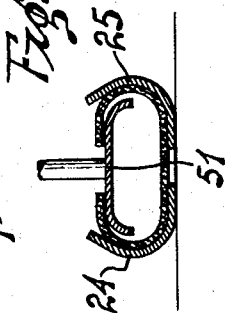
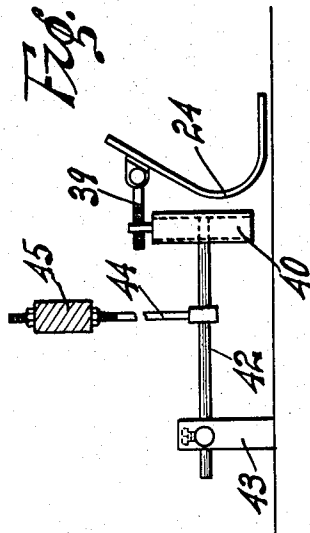


Fig. 5.



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2 Sheets-Sheet 2

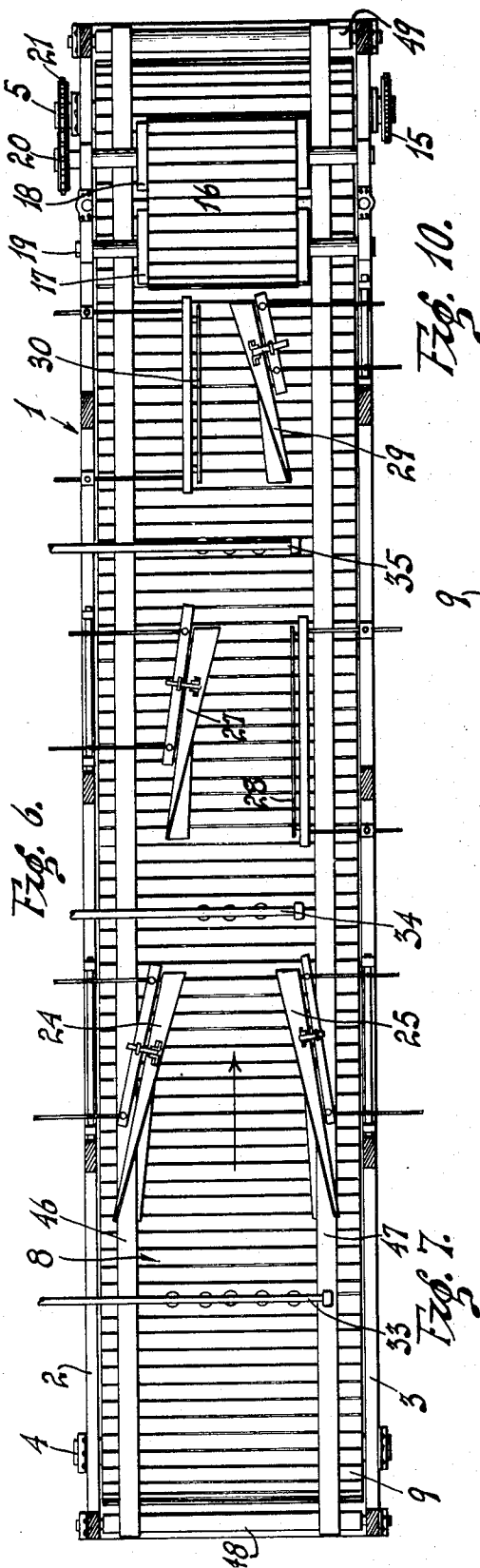


Fig. 6.

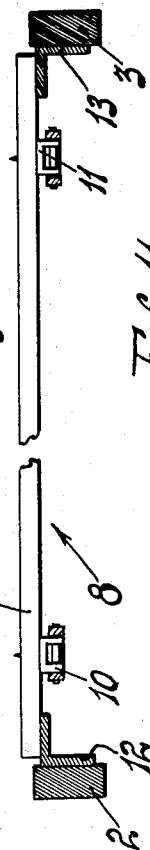


Fig. 10.

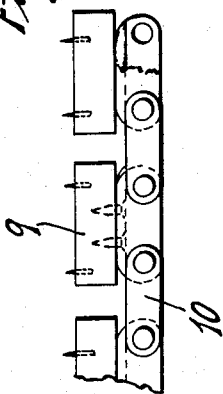


Fig. 11.

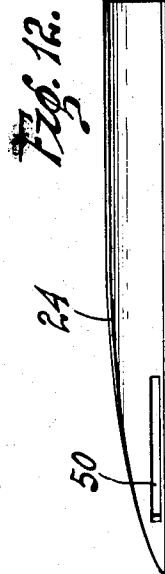


Fig. 12.

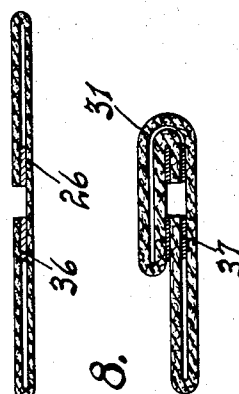


Fig. 8.

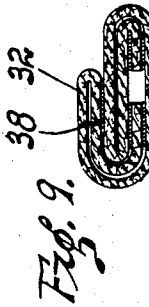


Fig. 9.

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FOLDING MACHINE FOR FIBROUS MATERIAL

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Application February 25, 1935, Serial No. 8,222

5 Claims. (Cl. 19-161)

This invention relates to a novel method of producing a continuous reinforced strip of fibrous material, and a machine for forming the same.

An object of our invention is to provide a reinforced strip of fibrous material folded in a novel manner so that only one edge of it is exposed in the final product.

Another object is to provide a machine for forming continuous lengths of reinforced fibrous material, including a novel conveyor which carries the material thruout the length of the machine, and novel folding means spaced at intervals thruout the length of the machine whereby the fibrous material is continuously folded into a resultant product of greater thickness than the product which enters the machine.

A further object is to provide a novel means for adjusting the folding means either horizontally, vertically, or angularly, jointly or separately, so that the amount and character of the fold of the product can be varied.

Still another object of our invention is to provide a novel means for carrying the edges of the fibrous material into the folders.

Other objects, advantages and features of invention may appear from the accompanying drawings, the subjoined detailed description, and the appended claims.

In the drawings—

Figure 1 is a side elevation of our folding machine.

Figure 2 is a diagrammatic transverse sectional view of a pair of folders, and a means to support the folded edge of the fibrous material.

Figure 3 is a perspective view of one of the folders.

Figure 4 is a top plan view of one of the folders and the means to adjust the same.

Figure 5 is an end view of the folder, as shown in Fig. 4.

Figure 6 is a top plan view of our machine with the upper supporting frame removed.

Figure 7 is an end view of the material after the first fold has been completed.

Figure 8 is an end view of the material after the second fold has been completed.

Figure 9 is an end view of the material after the third fold has been completed.

Figure 10 is a transverse sectional view of the supporting rails and the conveyor.

Figure 11 is a fragmentary side view of the conveyor.

Figure 12 is a side elevation of one of the folders.

Referring more particularly to the drawings the

numeral 1 indicates a frame formed of a suitable material which includes a pair of horizontal top frame members 2, 3.

A shaft 4 is journaled in the frame 1 adjacent one end of the machine, and a shaft 5 is journaled in the frame adjacent the other end of the machine. Sprockets, or pulleys 6 are secured to the shaft 4, and likewise, sprockets or pulleys 7 are secured to the shaft 5. The conveyor 8 traverses the pulleys or sprockets 6, 7, and is preferably of the slatted type, i. e., a plurality of slats 9 are attached to spaced chains or belts 10, 11.

In order to maintain the upper reach of the conveyor perfectly horizontal—for a purpose to be further described—we preferably provide a pair of sills 12, 13 attached to or formed upon the frame members 2, 3, respectively. The ends of the slats rest upon the sills thereby maintaining the upper reach of the conveyor exactly horizontal. The conveyor is moved in the direction of the arrows in Figs. 1 and 6, by means of a motor 14 and suitable power transmission means, such as the chain 15. An auxiliary pressure conveyor 16 is provided adjacent the outlet end of the machine and consists of a conveyor traveling over pulleys 17, 18 on the shafts 19, 20, respectively. The conveyor 16 is driven from the motor 14 thru a chain, or the like, 21. The conveyor is adjustable vertically by means of the screws 22 which extend thru a frame 23 in which the shafts 19, 20 are journaled. Thus, it is possible to compress the material to the desired degree, and also to assist—by a greater or lesser amount—the movement of the material over the conveyor 8.

Adjacent the forward or intake end of the machine, we provide a pair of folding dies 24, 25. These dies are strips of metal, wood, or the like, so shaped that as the material is forced thru them, the edges of said material will be folded inwardly upon itself. The result of the first fold is shown at 26 in Fig. 7. A second folder 27 is mounted at approximately the center of the machine and is similar in construction to the dies 24, 25.

The second fold of the material is from one edge only, and therefore, only one folding die is provided. The die is opposed by a fixed straight plate 28 which keeps the material from moving transversely of the machine.

A third folding die 29 is mounted adjacent the outlet end of the machine but ahead of the pressure conveyor 16. This folding die is also opposed by a fixed stationary plate 30.

The result of the second fold is shown at 31 in

Fig. 8, and the result of the third fold is shown at 32 in Fig. 9.

Ahead of each of the three sets of folders previously described, we provide nozzles 33, 34, 35.

5 These nozzles spray an adhesive or glue upon the upper surface of the material which is passing thru the machine. The nozzles spray a continuous strip of adhesive upon the material and over a substantially narrow band. The adhesive is shown at 36, 37 and 38, in Figs. 7, 8 and 9, respectively, showing the successive strips of adhesive which are placed upon the material. These strips are so arranged that none of the adhesive will appear on the outside of the completed 10 fibrous bat.

The folding dies, as well as the stationary plates, 28, 30 are adjustable, either horizontally, vertically or angularly, individually or jointly, so that the amount and character of the fold can be changed. As shown in Figs. 4 and 5, the folding dies are each provided with a threaded post 39 which is pivotally attached to the die, and which is threaded thru a block 40.

A pair of rods 41, 42 are pivotally attached to the block 40, and are slidably mounted in a plate 43 which is secured to the top of the frame 1. The outer ends of the rods 41, 42 are also supported from hangers 44 which depend from the top frame 45. Thus, it will be evident that by manipulating the rods 41 and 42, the folding die can be adjusted horizontally relative to the center line of the machine and can also be adjusted thru a horizontal angle. The pivotal mounting of the post 39 also permits the folding die to be 35 adjusted thru a vertical angle.

Some of the material which will be moved thru our machine may be very light and sheer, and therefore, the outer edges must be lifted into the first pair of folders 24, 25. For this purpose, 40 we provide a pair of bands 46, 47 which rest upon and move with the conveyor 8. The bands 46, 47 pass over rollers 48, 49 at each end of the machine. Each of the dies 24, 25 is provided with a slot 50 thru which the band passes.

45 From an examination of Fig. 6, it will be evident that the wide material—the edges of which will rest upon the bands 46, 47—will be raised into the folding dies 24, 25. After the material is once folded, it is not so flimsy, and thereafter 50 will move into the subsequent folding dies without difficulty. If necessary, however, additional bands can be provided which move into and thru the folders 27, 29.

It might be necessary, under certain conditions, to support the folded edges of the material, as shown in Fig. 2. For this purpose, we provide a stationary plate 51 positioned adjacent the folders 24, 25 and supported from the upper frame 45, or the like. This plate conforms generally to the shape of the folders 24, 25, both longitudinally and transversely, and is spaced from the folders so that the folded edges of the material are prevented from dropping until the entire fold is completed. The horizontal plate 51 65 will support the upper or folded edges of the material until said material has passed out of the folding dies. This will prevent double folding, or an irregular fold of the material, and will produce a result substantially as shown in Fig. 7. 70 This plate is only useful where flimsy or very sheer material is used.

Having described our invention, we claim:

1. A folding machine for fibrous material comprising a frame, a conveyor rotatably mounted 75 in said frame, the upper reach of said conveyor

being adapted to receive and convey fibrous material thruout the length thereof, folding means above said conveyor whereby a fibrous strip is continuously folded as said strip is conveyed thru the machine, and spray nozzles adjacent each of said folding means whereby adhesive of lesser width than the width of the material receiving the same is applied to the upper surface of the fibrous material prior to being folded.

2. A folding machine for fibrous material comprising a frame, a conveyor rotatably mounted in the frame, said conveyor being adapted and arranged to move the fibrous material horizontally thru the machine, a plurality of folding 15 dies fixedly mounted above the conveyor, said dies being arranged at intervals thruout the upper reach of the conveyor, and adhesive spray nozzles adjacent each folding die, said spray nozzles being fixedly mounted above the conveyor and 20 placing a band of liquid adhesive on the upper surface of the material, said band of liquid adhesive being of lesser width than the width of the fibrous strip receiving the same.

3. A folding machine for fibrous material comprising a frame, a conveyor rotatably mounted in said frame, the upper reach of said conveyor being horizontal, means to drive said conveyor, a pressure conveyor, said pressure conveyor being positioned adjacent the outlet end of the machine, 30 means to rotate said pressure conveyor, a plurality of folding means above the upper reach of the first named conveyor whereby the fibrous material is successively folded over upon itself a plurality of times, and adhesive spray nozzles 35 adjacent each of the folding means thruout the length of said conveyor whereby liquid adhesive is sprayed upon the upper surface of the fibrous strip in a band, as said strip traverses the machine, said band of liquid adhesive being of lesser 40 width than the width of the fibrous material receiving the same.

4. A folding machine for fibrous material comprising a frame, a conveyor rotatably mounted in said frame, the upper reach of said conveyor 45 being adapted to receive and convey fibrous material thruout the length thereof, folding means above said conveyor whereby a fibrous strip is continuously folded as said strip is conveyed thru the machine, a pair of bands, said bands moving 50 in the same path as the conveyor, means to drive said bands synchronous with the conveyor, said bands being arranged one at each side of the conveyor, said bands extending thru the folding means, said bands being adapted and arranged 55 to lift the outer edges of the fibrous material onto said folding means.

5. A folding machine for fibrous material comprising a frame, a conveyor rotatably mounted in said frame, the upper reach of said conveyor being adapted to receive and convey fibrous material thruout the length thereof, folding means above said conveyor whereby a fibrous strip is continuously folded as said strip is conveyed thru the machine, a pair of bands, said bands moving in 65 the same path as the conveyor, said bands resting upon the conveyor and driven by the same, said bands being arranged one at each side of the conveyor, said bands extending thru the folding means, the bands being adapted and arranged 70 to lift the outer edges of the fibrous material onto the folding means.

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