

July 31, 1934.

F. RENZ

1,968,172

BANDING MACHINE

Filed Aug. 24, 1932

3 Sheets-Sheet 1

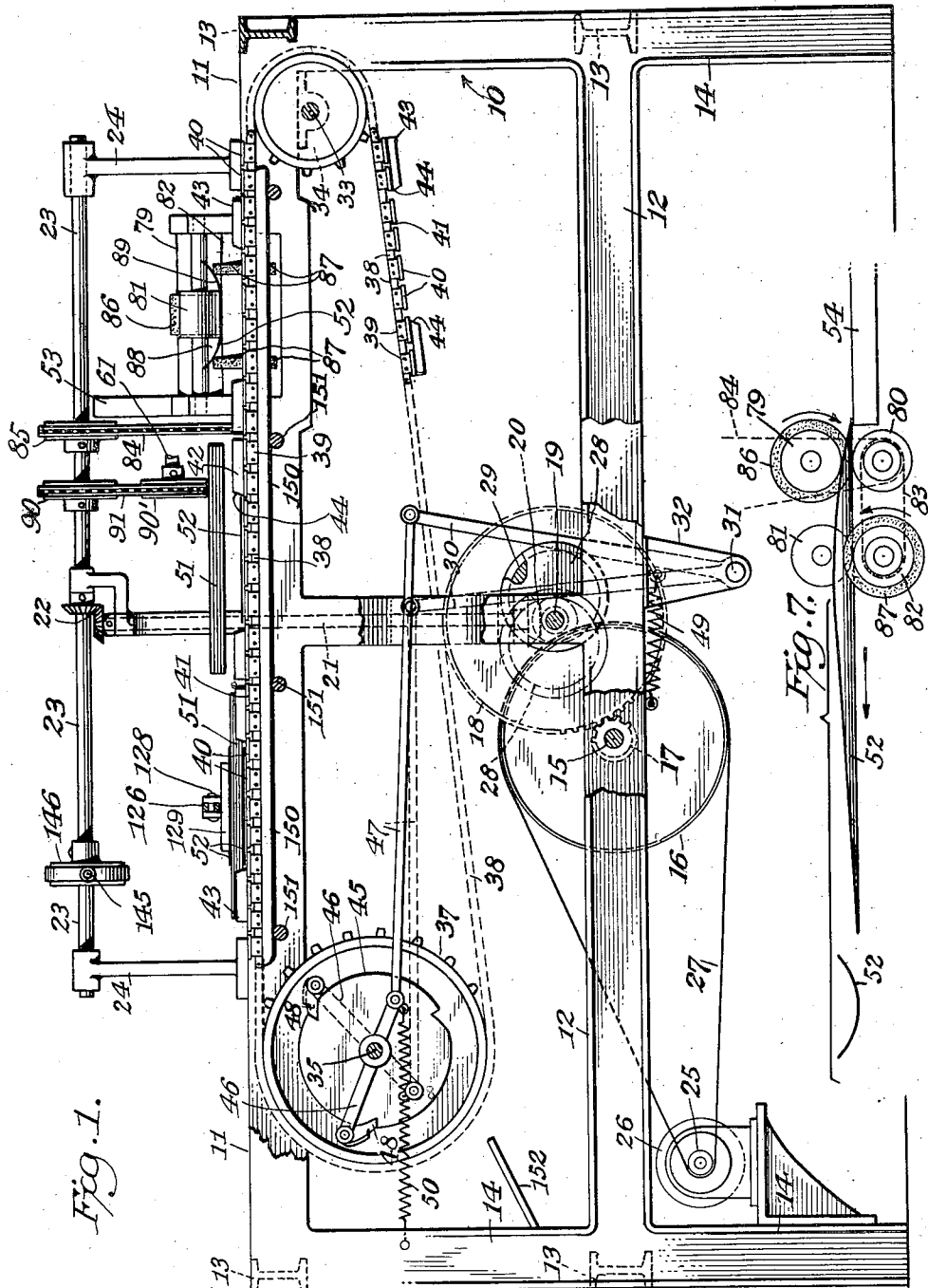


Fig. 1.

Fig. 7.

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3 Sheets-Sheet 2

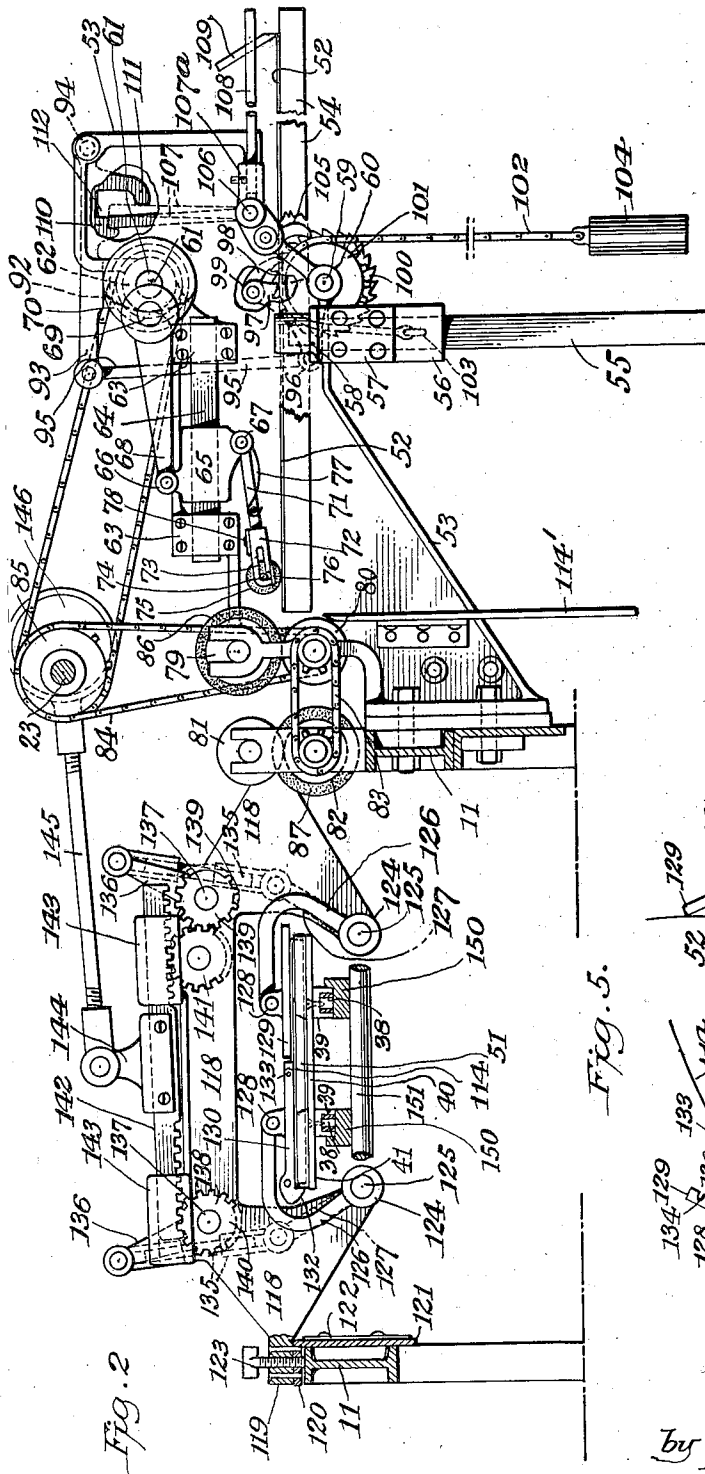
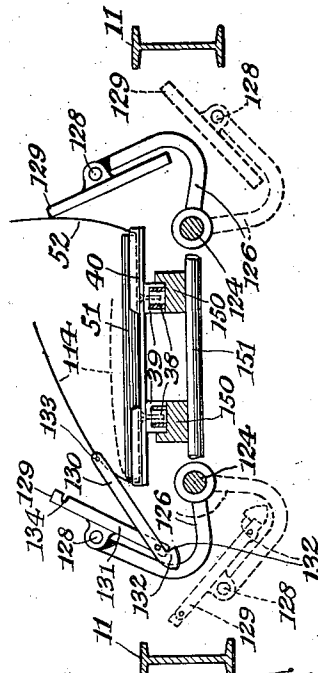


Fig. 2

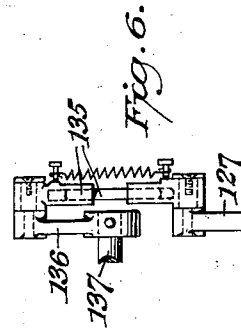
Fig. 5.



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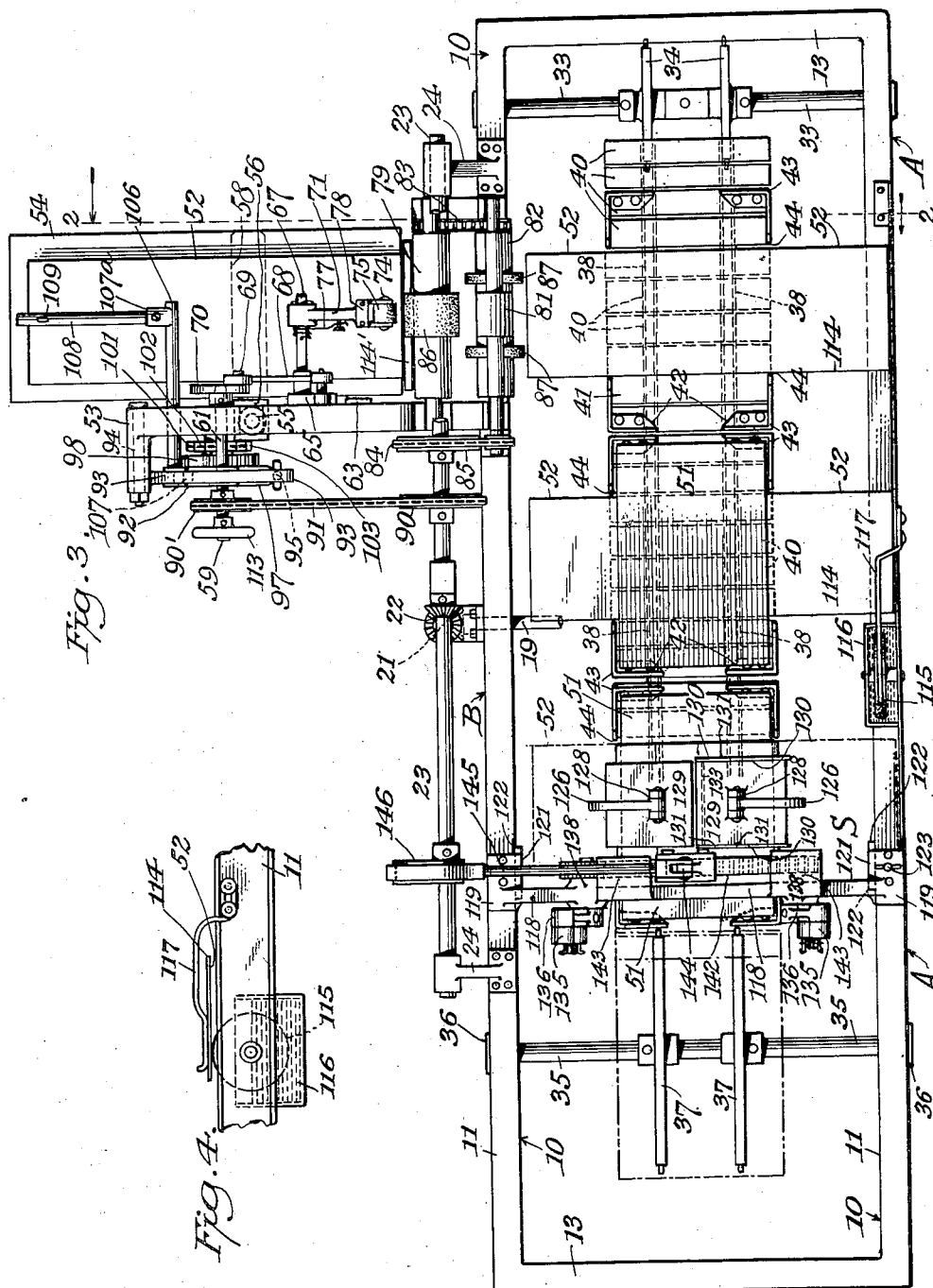
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BANDING MACHINE

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

1,968,172

BANDING MACHINE

Fred Renz, Brooklyn, N. Y.

Application August 24, 1932, Serial No. 630,255

8 Claims. (Cl. 93—93)

The present invention relates to a machine for effectively wrapping or banding stacks, packs, piles or fillers of paper sheets or other material, such as counted packs of ruled paper sheets.

reinforce the same in the feeding movement over and onto the conveyor.

Referring now to the drawings in detail, 10 designates a frame comprising top and bottom side rails 11 and 12, end rails 13 and corner posts 14.

Carried on a cross shaft 15 (Fig. 1) which is mounted in suitable journals on the bottom side rails 12, is a band wheel 16 and at the opposite side of the machine the shaft 15 carries a gear pinion 17, constantly in driving connection with a large gear wheel 18, fixed to another cross shaft 19, having a bevel gear connection at 20, with a vertically arranged shaft 21, which in turn is operatively connected through suitable gears 22, to a counter shaft 23, mounted above the frame in standard bearings 24.

The band wheel is connected to the drive pulley 25 of a motor 26 through a band, belt or chain 27. An eccentric disk 28 having a circumferential groove 29 is made fast to the shaft 19 and rotates therewith, and resting in said groove is a spring pulled oscillatory lever arm 30, shown pivoted at a point 31 on a suitable bracket 32 pending from a side rail 12 of said frame.

For the purpose of this description, referring to Fig. 3, I shall call the side A the "front" of the machine, for at that side the operator stands to deliver the packs to be wrapped by the machine, and the opposite side B of the frame, I shall call the "back" of the machine; likewise that end of the frame near where the wrappers or bands are fed in, I shall call the "front" or "forward" end of the machine, while the opposite end of the frame where the wrapped or banded packs are conveyed to a suitable conveyor or receptacle, I shall term the "back" or "rear" end of the machine.

At near the front end of the machine there is a preferably fixed cross shaft 33, on which a pair of spaced revoluble sprocket wheels 34 are mounted. At near the rear end of the machine there is another cross shaft 35, revoluble in suitable journals 36 in the frame 10. Spaced sprockets 37 are fixed to this shaft, and over the sprockets 34 and 37 runs a pair of parallel chains 38, each alternate link carrying a block 39, having threaded bores, and onto each block is secured by screws passing into said bores, a panel strip 40, which extends across between the parallel chains 38, to the block opposite to form a platform conveyor 41, for the purpose hereinafter set forth.

In carrying out my invention, I provide gages 42, arranged on and secured to the platform conveyor 41 with the centers thereof in correspond-

5 The principal object of the invention is to provide such a machine having mechanical features for progressively feeding the wrappers or bands to the machine, conveying said bands each with a pack of sheets thereon to a sealing station, applying a paste adhesive to said bands during the conveying movement, folding the ends of the bands in staggered movement upon the pack and applying sealing pressure to the overlapped ends of said band.

10 Another object of the invention is to provide preliminary operable means carried on an element of the final sealing means, for gravitationally folding primarily an end of the wrapping band for locating the said end in proper position when the sealing operation is performed.

15 Another object of the invention is to provide means for curving the wrappers upwardly from the longitudinal center in the feeding action thereof, to stiffen said wrappers and expedite the proper placement thereof.

20 Another object of the invention being to provide a simple and dependable automatic means for stopping the feeding mechanism of the machine when the wrappers are exhausted.

25 The invention has for its further objects to provide certain other novel features, all of which will be more clearly defined in the following detailed specification and recited in the subjoined claims.

30 In the drawings:

Fig. 1 is a partial side elevation of the banding machine with parts omitted and partly diagrammatic.

40 Fig. 2 is a cross section of the frame and an elevation of a bracket and their associated parts, about on the dotted line 2—2 of Fig. 3.

Fig. 3 is a plan view of the machine with parts omitted and more or less diagrammatic.

45 Fig. 4 is a detail of the adhesive applying devices.

Fig. 5 is a fragmentary side elevation disclosing some of the steps in the folding operation.

50 Fig. 6 is a detail showing a yielding link employed in the sealing mechanism.

Fig. 7 is a detail diagrammatic side elevation showing the band feeding rollers and the manner in which a band is progressively and longitudinally cross-curved or cupped, to strengthen or

ing longitudinal alignment; the gages including corner plates having short upstanding corner walls 43, collectively defining a space, little larger than the paper sheet packs to be placed therebetween subsequent to the feeding placement of a band across said platform conveyor and centrally across the space defined by the above referred to walls 43 of the gages, and for the reception of said bands, the gage walls at the sides of the platform conveyor are spaced, as at 44.

To the platform conveyor 41 is imparted a series of step movements, being such as to bring the center of each successive gage into registration with the center of the bands being successively fed transversely or across the conveyor and upon which packs are placed as each passes the operator, and to accomplish the above described step movements I provide a ratchet wheel 45, fast on the cross shaft 35, and an arm 46, loose on said shaft, and rockable through a link 47, which is connected pivotally to the upper portion of the eccentric controlled lever arm 30, said arm 46, having a dog 48, to engage the teeth of said ratchet wheel 45, to impart a one third turn thereto for advancing the platform conveyor through a required step movement. Springs 49 and 50 may be employed to restore the arms 30 and 46, at the end of a conveyor feeding operation. The packs to be banded are designated at 51 and the bands 52.

It should be noted that no serious attempt has been made to accurately proportion the parts of the machine and to accurately time the various operations relatively, but it is believed the illustrations and description will suffice to the perfect understanding of said machine.

Feeding mechanism

The mechanism for accurately feeding the wrappers or bands to the machine, and for stopping the feeding operation when the supply of bands is exhausted may be described as follows:

Bolted or otherwise secured to the back of the frame 10, is a backwardly extending main bracket 53, preferably of suitable cast metal, on which coacting feeding parts are carried, and on which a table 54, or other appropriate support for the wrappers or bands 52, is adjustably supported in a horizontal position, means being provided for feeding the same slowly upwardly as the wrappers are drawn therefrom by suitable feeding rollers, as will hereinafter appear.

Pending from the metal bracket 53 is a preferably cross sectionally square guide bar 55, upon which is slidably mounted a sleeve 56, to the front face of which is attached an angle bracket 57, having a comparatively long horizontal leg 58, which underlies and supports the table 54 and is attached thereto by screw bolts or the like, so that the sleeve and table move together.

To better place the elements of the feeding mechanism, I may call the side of the main bracket 53, next to the table 54, the "front" or "front face or side," and the opposite side the "back" or "rear face or side" thereof, and further, to reduce confusion, I shall in the description and claims refer to the shaft 59, revoluble in the bearing 60 of the main bracket 53, as the "lower" shaft, and the shaft 61, revoluble in the bearing 62, of the main bracket 53, as the "upper" shaft.

The main bracket 53 on its front face, is provided with box supports 63, for a guide bar 64 which is clamped against movement therein, and riding this guide bar, is a slide block 65, having

top and bottom perforated ears 66 and 67, the former connected through a link or pitman 68, with the crank pin 69 of a crank disk 70 carried by and with the upper shaft 61. The bottom perforated ear 67 on the slide block 65 is pivotally connected to a feeder arm 71, and has a yoke 72 having bayonet joint slots 73 in its opposite sides to receive the trunnions 74 of a rubber faced feed roller 75. The trunnions 74 cannot escape from the slot 73, by reason of a throat plate 76, and said roller may rotate idly at that end of the slot, as a band is being withdrawn from the table, and when the slide block 65 is being drawn backwardly by the crank pin 60 to start another forward feeding movement, but as this forward movement starts, the roller normally forced into feeding contact with the upper band of a stack by a spring 77, will roll backwardly against a gripper or locking plate 78 and thus the locked roller will frictionally grip the said top band and move it to a series of high speed feed rollers which now will be described;

For clarity of description, I shall designate the feed rollers 79 and 80, as a pair, as "pickup" rollers, and the feed rollers 81 and 82, as a pair, as "delivery" rollers.

The lower pickup roller 80, is in driving connection with the lower delivery roller 82 through a chain 83, or the like, and the shaft of said lower pickup roller 80, opposite the chain connection 83, is in driving connection with the countershaft 23, through a chain 84 or the like and sprocket 85, of a size to transmit the desired speed to said rollers.

As best seen in Figs. 1 and 2, the pairs of pickup and delivery feed rollers are designed for quick feed action and for forming the procession of fed-in bands to progressively curved contours on the longitudinal center or axis of the wrappers or bands for reinforcing or stiffening them in the long feeding motion, across the respective or relative gages, so that each may be deposited in progressive uniform position on the platform conveyor and to correspond to the centers of said gages.

To produce a progressing cross sectional bend in a band in the process of delivery, I preferably supply the upper pickup roller 79, with an enlarged rubber ring or band 86, arranged at the longitudinal center of the said roller, and short in length; and on the lower roller 82, of the delivery pair, I supply rubber rings or bands 87, separated to a distance considerably greater than the length of the ring or band 86, on the pickup roller 79, thus creating a staggered passage 88, for laterally curving the passing bands as shown at 89 in Figs. 1 and 7 of the drawings.

The power for feeding the wrappers or bands 52 from the table 54, is taken from the countershaft 23 through a sprocket 90, a chain 91, and another sprocket 90' fast on the upper shaft 61 of the bracket, and also fixed to this shaft is a cam 92, for operating a trip arm 93, pivoted to the bracket 53, at one end as at 94, and connected at its free end through a link 95, to one arm 96 of a bellcrank lever 97, swingable on the lower shaft 59. A dog 98, is pivoted to the other bell crank arm 99 and drives the ratchet wheel 100 a step at each rotation of the cam 92, or at each passage of a band through the feeding means. The rotary step movements of the ratchet wheel 100 rotates the lower shaft 59 and rotates therewith a sprocket wheel 101, carrying a chain 102, connected at one end as at 103

to the slidable sleeve 56 and having suspended from the other end thereof a weight 104 whose ponderosity slightly overbalances the table 54 and associated parts when the bands are exhausted therefrom. When the table is loaded a stop dog 105 supports the weight between operations of the cam controlled parts as will be obvious.

Means are provided for stopping the feed when the table is empty, and comprises a rock shaft 106, extending through the bracket 53; and back of the bracket, an upright trip-finger 107 is fast to said shaft 106, and in front of said bracket the shaft is extended, as in Fig. 3, and carries a socket 107a for a needle arm 108, carrying a detent needle 109 for holding the hand immediately thereunder when the top band is fed forwardly.

Normally, when the machine is operating and bands are being fed from the table progressively, the weight of the needle arm 108 holds the finger 107, out from under the shoulder 110 and over against the stop 111, permitting the finger to enter the socket 112 each time the cam 92 permits the trip lever to drop for another step feed of the ratchet 100, but when the table is empty it rises to the position shown in Fig. 2, and contacts with said needle 109, raising the needle bar 108 and tilting the finger 107 over under the lug 110, thus stopping the table feed.

The table may be quickly reloaded by manipulating the hand wheel 113, on the lower shaft 59, after raising the feed dog 105, both associated with the ratchet wheel 100.

The bands on the table are maintained in proper stacked relation by an aligning plate 114, supported by the bracket 53, see Fig. 2.

A wet adhesive may be applied to the longer end 114 of the bands 52, when moving to the sealing station, (see Fig. 4) by a free roller 115, rotating in a glue pot 116, shown on the front side A of the frame 10, and to guide the passing ends 114 of the bands properly into contact with the wet roller 115, a wire finger 117, is provided as in Fig. 4, of the drawings.

Folding and sealing mechanism

I shall now proceed to describe the folding and sealing means for applying the bands to the packs in rapid progression, the means being properly timed to accomplish the desired operations between the step movements of the platform conveyor.

Preferably I employ a bridge frame 118, having horizontal end plates 119, permanently secured by rivets to the bent ends 120, of downwardly extending guide plates 121, held between guide bars 122 to hold the bridge frame 118 against horizontal movement on the frame 10. Passing through threaded bores in the said frame plate 119 and bent ends 120, are heavy set screws 123, bearing directly on the side bars 11 of the frame 10, and by manipulating these screws, the bridge frame and its supported parts may be adjusted vertically with respect to the platform conveyor to accommodate packs 51, of various thickness to be banded.

The bridge frame 118, is formed with downwardly directed bearings 124, each supporting a rock-shaft 125, which carries a bent arm 126 at the front of the bridge frame, and a straight arm 127, at the rear of said frame.

Each of the bent arms 126 carries, through a pivot joint 128, a folding and sealing plate 129 of a size to engage and press upon the greater

part of the ends of the bands to ensure a secure seal along the entire line of adhesive previously applied to the longer ends 114 of said bands.

To insure a perfect placement of the opposite ends of the bands 52, the sealing plate 129 acting on the longer band-end 114 having the adhesive thereon, carries a pivoted frame 130, comprising side arms 131, having hooks 132 at one end to force the folded long end 114 over the pack to a proper folded position, and the free ends of the arms of said pivoted frame 130, are connected by a wire or rod 133 which normally rests in a cross groove 134, but in operation, the wire rests against the longer band end 114, to impart a preliminary fold to said end and deposit it under the shorter end of the said band when the frame 130, tilts by gravity as clearly shown in Fig. 5, and previous to the final sealing down of the plates 129.

To impart a properly timed sealing oscillation of the bent arms 126, around the bearings 124, the straight arms 127, on the rocker shaft 125 in said bearings are connected through yielding links 135 to rock-arms 136 fixed on rock-shafts 137, mounted in bearings 138 in said bridge-frame. The shafts 137 carry gear pinions 139 and 140, the former being in mesh with a direction idler gear 141.

The driving operation of this mechanism is accomplished through a gear rack 142, operating through guides 143, and in mesh with pinion 138 and idler 141. The gear rack has fixed thereto a bracket arm 144, perforated to receive one end of a link bar 145, operatively connected at its opposite end to an eccentric disk 146, on the counter shaft 23, through which reciprocatory movements are transmitted to said gear rack.

The platform chains 38, are preferably supported between the front and rear sprocket wheels by tracks 150, resting on cross tie bars 151, or the like, and a chute or conveyor 152 (Fig. 1) may be provided to deliver sealed packs to a receptacle or where desired.

By the term "curving said band longitudinally" I mean "cupping", which more definitely defines a strip of paper bent longitudinally upward from the center thereof, and I may make use of this term in some of the claims.

I claim:

1. In combination, means for adjustably supporting a stack of wrappers; means for progressively feeding the topmost wrapper from the stack; means for progressively conveying said wrappers; means for bending said wrappers longitudinally for stiffening the same and for simultaneously shifting the bent wrappers over and onto said conveyor to a determined position; means for applying a wet adhesive to said wrappers as they move with said conveyor; as a stack of sheets to be wrapped are placed thereon; a pair of elements simultaneously operable for sealing the ends of the wrappers; means independently operable and carried on one of said elements for folding an end of the wrappers prior to the operative sealing contact of said elements.

2. In a machine for applying wrappers to stacks of sheet material, a support for said wrappers, common conveyor means for the wrappers and stacks, means for delivering wrappers progressively to said conveyor; means for laterally curving each sheet progressively throughout its length and from its forward end during the delivery motion to stiffen it longitudinally; means for applying an adhesive to an end portion of each wrapper in its travel on said conveyor; means for sealing the ends over a stack and auxiliary

means on said sealing means operable prior to the final sealing action for pressing one of said ends down below the sealing path of movement of the opposite end.

- 5 3. A machine of the class described; comprising a frame; a platform conveyor therein; gages mounted on said conveyor; means for imparting step movements to said conveyor a distance greater than the centers of said gages; a support
10 for bands; means for feeding said bands from said support across and into said gages; means for curving said bands longitudinally in the feeding movement thereof; means for applying a wet adhesive to an end of said bands as they
15 are moved on said conveyor and when a pack to be banded is resting thereon; and means for sealing the ends of said bands during a stop in the travel of said conveyor.

4. A machine of the class described; comprising a frame; a platform conveyor mounted for step movement therein; rectangular gages on said conveyor and substantially the size of the packs to be banded; a support for bands; said
20 gages having openings at the sides thereof of a width slightly greater than the width of said bands, means for progressively feeding said bands over and across said platform conveyor to rest in the said openings of said gages prior to the placing of a pack thereon and within its
25 respective gage, means for applying an adhesive to an end of said band in its movement to the sealing station; and means, including a preliminary folding frame, for sealing the ends of said band on said pack.

5. A machine of the class described; comprising a frame; a conveyor mounted for intermittent movement, gages on said conveyor having an opening in each side thereof; a support for bands, the walls of said gages defining a space
30 slightly greater than the packs to be banded; means for progressively feeding said bands across said conveyor to rest in the side openings of said gages, the forward free ends thereof having a

longer overhang than the rear ends; means for cupping the bands longitudinally during said feeding movement, means for applying adhesive to the longer ends of the bands when moving with said conveyor and a pack to be banded resting in its respective gage and means for sealing the ends of said bands.

6. In a machine for applying bands to sheet stacks; comprising a support for the bands, an endless conveyor operable at a right angle to the longitudinal medial line of said bands; devices providing staggered delivery contacts for feeding the bands in longitudinal cupped form across said conveyor each in a position to receive a sheet stack thereon; means for applying a line of adhesive across an end of each band and means for sealing the ends of said bands.

7. In a machine for applying bands to sheet stacks comprising a support for bands, a conveyor, gages on said conveyor for the stacks, means for progressively feeding the bands across the conveyor and gages, each band to carry a sheet stack; means for applying an adhesive to the bands; and means for sealing said bands around the sheet stacks, said sealing means including a pair of rock-plates, one having a frame thereon for urging a band portion to a low position before the rock-plates operate.

8. The method, for applying bands to sheet stacks; which consists in feeding the bands to a movable support progressively, and simultaneously reinforcing said bands by cupping them longitudinally; placing a sheet stack in an appropriate position on each band; moving the bands and stacks on said support simultaneously and at intervals; applying adhesive to said bands during one of said movements; folding the ends of said bands in overlapping relation, inwardly and downwardly upon each respective sheet stack; then applying sealing pressure to said ends of said bands.

FRED RENZ,

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