

Sept. 23, 1930.

A. FRONTZ

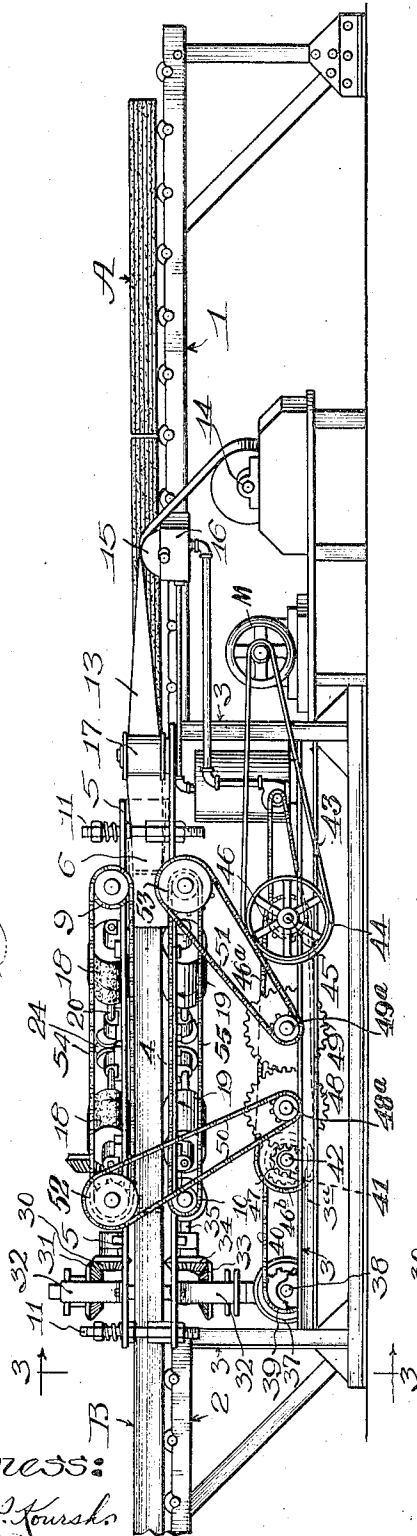
1,776,255

PACKAGING MACHINE

Filed April 19, 1928

2 Sheets-Sheet 1

Fig. 1



Witness:
Geo. P. Koursh

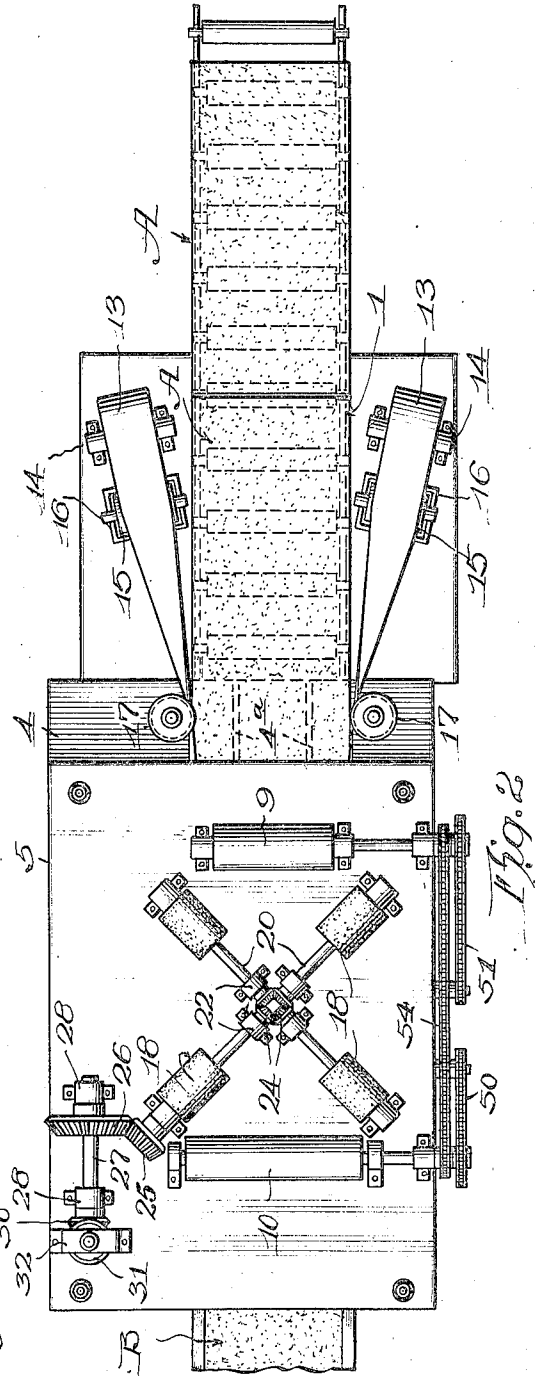


Fig. 2

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2 Sheets-Sheet 2

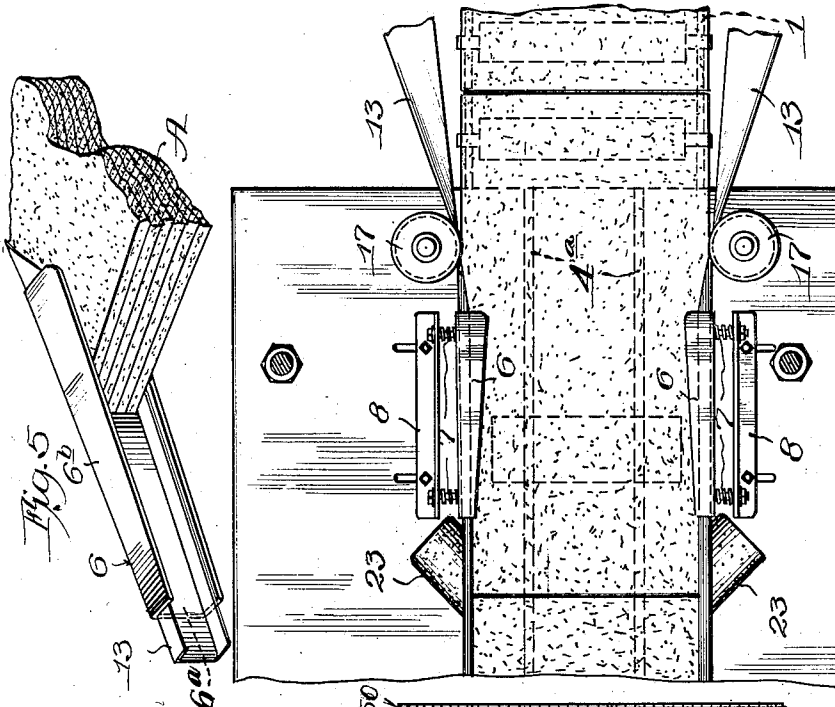


Fig. 4

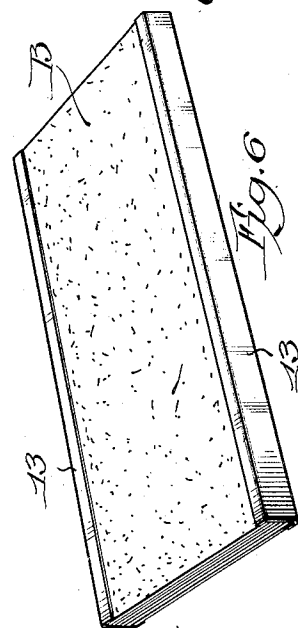


Fig. 5

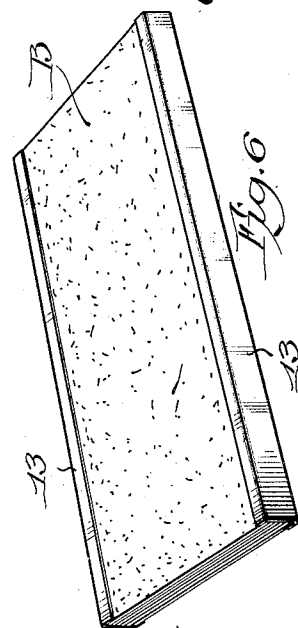


Fig. 6

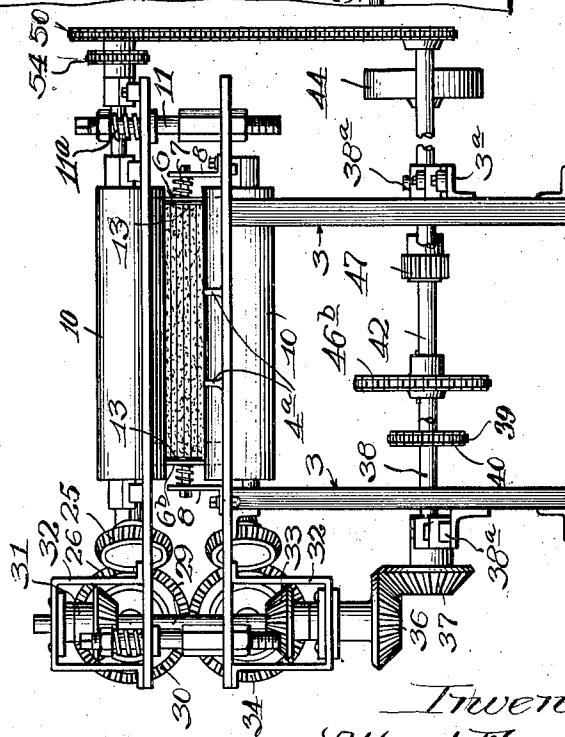


Fig. 3

Witness:
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UNITED STATES PATENT OFFICE

ALBERT FRONTZ, OF PORT CLINTON, OHIO, ASSIGNOR TO THE AMERICAN GYPSUM COMPANY, OF PORT CLINTON, OHIO, A CORPORATION OF OHIO

PACKAGING MACHINE

Application filed April 19, 1928. Serial No. 271,154.

This invention relates to improvements in packaging machines, and more particularly to machines for packaging sheets of gypsum wall covering material for shipment and convenient handling.

The particular product requiring packaging is generally known in the trade as gypsum lath as distinguished from gypsum plaster board or wallboard, which is made in large panels in widths upwardly of 32 inches and in length from 3 to 10 or 12 feet. Gypsum lath is in reality plaster board either made or cut to smaller sizes, usually 16 inches in width and 36 or 48 inches in length, and is also used as a substitute for wood or metal lath for wall and ceiling construction, its width being equal to the standard distance (16 inches) between centers of the studding or joists. As is the case of plaster or wallboard, the composition of the lath is a core of calcined gypsum or stucco, covered by layers of paper, the standard thickness being $\frac{3}{8}$ of an inch. The foregoing sizes and character of materials is only illustrative, however, since other material in sheet form may be equally well packaged by the same means.

These sheets are preferably shipped in packages of six or nine, depending on the size, but because of the relatively fragile nature of the sheets it has been found impractical to use bands of wire or metal strapping for this purpose, inasmuch as they cut into the edges of the outer sheets. It has been proposed, therefore, to secure the sheets in packages by applying strips of paper along the edges of the bundles in somewhat the same manner that paper cartons are now being sealed by adhesive paper tape.

The object of the invention is therefore to provide a machine which will automatically apply the binding strips to the piles of sheets as they are fed to the machine, and at such a rate that the taping method can be employed profitably.

Bearing in mind that the sheets are loosely piled one upon another, the packaging or bundling process is something more than a mere sealing of the edges together, inasmuch as the sheets must be compressed while the

strips are being applied so that the pressure between the outer and intermediate sheets will keep the package intact.

With the foregoing introduction, the construction an operation of the machine embodying my invention will now be disclosed in connection with the accompanying drawings, in which

Figure 1 is a view in side elevation of the packaging machine,

Figure 2 is a top plan view of the machine,

Figure 3 is a view in vertical section as taken on line 3—3 of Figure 1,

Figure 4 is an enlarged top plan view of the feed end of the machine proper with the upper plate removed,

Figure 5 is a perspective view showing the action of the folders, and

Figure 6 is a perspective view of a package of gypsum lath.

The general idea of the arrangement of the main parts of the machine is obtained from Figure 1. A feed track 1 leads to the machine proper from a nearby source of supply where the sheets are placed on the track in piles of say six sheets deep, these piles being advanced endwise with their ends abutting. On the opposite or take-off side of the machine proper is a discharge track 2 on which the packages are discharged. As shown these packages are connected together by the continuous binding strips which are thereafter parted as they are removed from the track, by cutting the strips at the joints either automatically or by hand.

Both the delivery track 1 and the discharge track 2 are preferably of the standard roller type conveyor track, consisting of longitudinal side rails and crosswise rollers. This construction is so common that further description is unnecessary.

The packaging machine proper is elevated above the floor to about table height and consists of a supporting frame 3 and a pair of horizontal parallel plates 4 and 5, the normal distance between these plates being slightly in excess of the thickness of the piles of sheet material. On the upper face of the lower plate 4 are tracks 4^a, 4^b in alignment with the delivery and discharge tracks

1 and 2 forming a continuous path for the advancing piles. At the entrance to the space between the plates is a pair of folders 6, 6, consisting generally of channel shaped members set on edge at opposite sides of the path of the entering piles of material and consisting of an upright back wall 6^a and inwardly projecting flanges 6^b, 6^b. These folders are preferably made of sheet metal, tapering slightly from end to end, that is, the vertical distance between their inwardly projecting flanges 6^b, 6^b, gradually decreasing in height from their entrance to their discharge ends. The width at the entrance end of the folders is substantially equal to the thickness of the piles of material when loosely stacked one on the other and the height of the opposite or discharge end is equal to their ultimate thickness when compressed. These folders are not fixed, but are yieldably mounted in the path of the edges of the material passing through them by means of coil spring mountings at each end, viz, springs 7, 7 secured to the back wall 6^a of the folders and supported by L-brackets 8, 8, adjustably mounted on the lower plate 4 just behind the folders. These springs 7, 7 exert a pressure against the folders holding them in yielding contact with the edges of the material to be packaged.

Mounted on the upper and lower plates 4 and 5 are pairs of pressure feed rolls 9, 9 and 10, 10, one pair being located adjacent the forward edges of the plates and the other in a corresponding position near their rear edges. These pairs of rolls extend transversely of the path of the material through the machine and are journaled one above the other in bearings on the upper and lower sides of the top and bottom plates respectively. Moreover, these rolls project through openings cut in their respective plates so that their peripheries extend into the space between the plates, with the distance separating them substantially the same as the thickness of the material to be packaged.

It will be observed that the two horizontal plates 4 and 5 are substantially duplicates of one another, but reversed with respect to each other, that is, each part carried by the top plate has a corresponding part on the bottom plate, the pairs of rolls 9 and 10 being typical of this reversed arrangement. These plates, however, are relatively adjustable, the bottom plate being fixed and the top plate movable by means of four adjusting screws 11, (one at each corner), designed as to permit the plates to be separated at the proper distance for the number of sheets to be packaged, and yet with a slight yielding of the upper plate through a spring 11^a at the upper ends of the screws.

Referring again to the folders 6, 6, the same are adapted to fold continuous strips 13, 13, of adhesive paper around the longi-

tudinal edges of the piles of material passing through the machine. The paper strips are provided in the form of rolls located on either side of the feed track 1, and forwardly of the folders 6, 6, and mounted on suitable spindles as at 14, 14. The paper strips are led from the rolls over glue rollers 15, 15, just above and slightly forward thereof. Associated with the glue roller is a glue reservoir 16 into which the glue roller is immersed so that the glue is transferred to the paper band as it passes over the roller. Just in front of the folders 6, 6, is a pair of revolving guide rolls 17, 17, turning freely on a vertical axis. These guide rollers are preferably flanged at their top and bottom and serve to lead or guide the strips from the glue rolls to the folders, the strips being twisted through 90° in passing from one to the other.

Between the two sets of pressure rolls 9 and 10, and grouped at the central portions of the plates 4 and 5, are four pairs of rotary brushes, each consisting of a top and bottom brush 18, 19 rotative about parallel horizontal axes. As clearly shown in Figure 2, the upper set of brushes, four in number, are arranged in the form of a cross or X, the axis of each two brushes being coincident and arranged at right angles to the other two. Moreover, the axis of each brush is positioned at an angle of 45° to the direction of the passage of the material through the machine, as may be indicated by the tracks 4^a, 4^a lying just inside of the pairs of brushes on opposite sides of the tracks, Figure 2. Each brush is mounted on a shaft 20 journaled at its outer and inner ends in bearings 21, 22 mounted on the upper or lower face of the plate as the case may be, openings 23 being formed in its plate so that portions of the brushes project through and into the space between the plates, as shown in Figure 1. The inner ends of the shafts 20 carrying the brushes 18 and 19 converge to a central point about which are grouped their several journal bearings 22, and just beyond these bearings are miter gears 24, one on each shaft and all meshing with each other. Thus if one of the shafts be a driven shaft, which is the case of the upper right-hand brush shaft, all of the shafts will rotate at the same speed but alternately in opposite directions. As will be presently understood, the brushes on the opposite sides of the tracks 4^a, 4^a rotate toward the center of the machine.

The same grouping of the lower set of brushes is followed as well as the same method of driving the brushes, so that one set may be regarded as a duplication of the other, with due regard to the reversal of direction of rotation of each upper and lower brush, as indicated by the arrows in Figures 1 and 2.

The method of driving these brushes is clearly shown in Figures 2 and 3. At the outer end of the upper left-hand brush shaft 20

(Figure 2) is mounted a bevel pinion 25 meshing with a beveled gear 26 carried on a stub shaft 27, journaled in bearings 28, 28 supported on the upper plate 5. This stub shaft 27 is driven from a vertical shaft 29 through a pair of miter gears 30, 31, said vertical shaft passing through the adjacent corner of the plates 4 and 5 and journaled in U-shaped bearing hangers 32, 32 mounted on said plates (Figure 3). A miter gear 33 is keyed to the vertical shaft 29 just below the bottom plate 4 and another miter gear 34 on a shaft 35, which drives the lower set of brushes 19 and is the duplicate in all particulars of the drive for the upper set of brushes. It may be mentioned in passing that the miter gear 31 at the upper end of the vertical shaft 29 is so mounted that it can slide endwise on the shaft so as to accommodate any adjustment of the top plate relative to the bottom plate. However, such a mounting is a common expedient and therefore the details of construction are not necessary.

At the lower end of the vertical shaft 29 is a miter gear 36 meshing with a miter gear 37 on a horizontal shaft 38 extending transversely of the machine frame below the plates 4 and 5 and journaled in bearings 38^a fixed to the longitudinal members 3^a, 3^a thereof. On this shaft 38 is a sprocket wheel 39 carrying a chain 40 leading to a sprocket pinion 41 (Figure 1), a duplicate of sprocket wheel 39, mounted on a countershaft 42 which is driven in a manner presently to be described.

The drive for the machine needs no particular elaboration. A motor M is the source of power and drives by a belt 43 to a pulley 44 mounted on a shaft 45 on which is mounted a sprocket wheel 46. A sprocket chain 46^a from said sprocket wheel 46 to a sprocket 46^b on the shaft 42 is the immediate source of power for the rotary brushes 18 and 19. Also mounted on the countershaft 42 is a pinion 47 meshing with the left-hand of two intermeshing gear wheels 48 and 49 rotating in opposite directions. Turning with the gear wheels 48 and 49 are sprocket pinions 48^a and 49^a, respectively, each carrying a sprocket chain 50 and 51, respectively, leading upwardly to sprocket wheels 52 and 53, the former being mounted on the shaft of the upper rear pressure roll 10 and the latter on the shaft of the lower front pressure roll 9. Connecting the shafts of the upper and lower pairs of pressure rolls 9 and 10 are two horizontal sprocket chains 54 and 55 having their own sprocket wheels of the same diameter mounted on the said shafts.

Without tracing through the pressure roll drive, it is sufficient to say that it is arranged to rotate the upper and lower sets of pressure rolls at the same speed but in opposite directions, so as to advance the material through the machine from right to left.

The operation of the machine is now read-

ily apparent. The piles of material A to be packaged are placed end to end on the feed conveyor track 1, and advanced continuously into the machine proper, this being done either by hand or by a feed belt inserted at some point in the track.

The piles A on reaching the entrance to the machine pass between the folders 6, 6, to which the strips of glued paper 13 are also being fed in vertical position, and are thus applied to the side edges of the piles and their upper and lower edges folded over and upon the upper and lower sheets, as shown in Figure 5. As the forward ends of the piles advance through the folders they are gradually compressed or squeezed together by the convergence of the upper and lower flanges 6^b, 6^b, of the folders and thereupon pass between the first pair of feed rolls 9 and 10. These rolls now feed the piles forward, at the same time maintaining them under a predetermined pressure into the path of the sealing brushes 18 and 19 which act on the still moist margins of the sealing strips to draw the strip tightly around the edges of the piles while the same are being advanced. Just beyond the brushes the piles which are now in package form pass between the second set of feed rolls, which maintain the packages under pressure, giving the glue an opportunity to become sealed and also advancing the interconnected packages B onto the discharge track 2 from which they are removed after severing the sealing strips at the joints between the packages.

The advantage of this method of packaging is the compactness and security of the package thus obtained. The sealing strips afford protection to the edges of the sheets in handling and are readily slit when the packages are to be used, the excess paper being torn from the outer sheets without marring the surfaces thereof.

The machine is relatively simple in construction and operation and yet handles the materials and applies the sealing strips with ample speed and uniformity to meet all the requirements of commercial production.

Having therefore set forth a preferred embodiment of my invention, I claim:

1. A machine for packaging piles of sheet material, comprising a track, folders mounted on opposite sides of said track, means for guiding strips of binding material from a continuous supply to said folders, to be folded thereby around the side edges of the advancing piles, a pair of pressure rolls above and below said track acting to press the material together during the application of said binding strips, and a pair of rotary sealing members located beyond said folders and adapted to engage the edge faces of said packages to tightly seal the binding strips around the same.

2. A packaging machine for the purpose

described comprising a track along which the materials to be packaged are continuously advanced, means for continuously applying strips of adhesive binding material along the edges of the materials to be packaged, means for compressing the materials as the binding strips are being applied, and rotary brushes mounted above and below the path of the packaged materials and rotative in a direction to draw the strips about the edges of the packaged materials and to seal them against the upper and lower faces thereof.

3. A machine for packaging sheets of building material, comprising a track along which the material is advanced in piles, a pair of horizontal plates spaced apart above and below the path of the material along said track, folders mounted between said plates and on opposite sides of said track, means for guiding binding material in continuous strips into contact with the edges of said piles of material as they are advanced into said folders, means for applying adhesive between the contacting surfaces of said strips and the material to be packaged, and a series of rotary sealing brushes mounted on said plates and beyond said folders and acting to seal the edges of said strips against opposite faces of said piles.

4. A machine for packaging piles of sheet material, comprising a track, folders mounted on opposite sides of said track, means for applying adhesive to continuous strips of binding material and guiding the same into said folders and thence around the side edges of the advancing piles, pairs of pressure rolls above and below said track and spaced apart to press the material together during the application of said binding strips, and a pair of rotary sealing members located between said pairs of pressure rolls adapted to engage the edge faces of said packages to seal the binding strips around the same.

5. A machine for packaging sheets of building material comprising a track along which piles of said sheets are advanced endwise in abutting contact at their ends, a pair of folders mounted on one of said plates and in parallel relation in alignment with the edges of the piles of material to be packaged, means for guiding strips of binding material into said folders and against the edges of the material, means for applying adhesive to the contacting surfaces of said strips, a pair of pressure rolls beyond said folders for applying pressure to said material, pairs of rotary brushes mounted beyond said pair of pressure rolls and in the path of the edges of the material and adapted to seal the edges of said strips against the faces of the material, and a second pair of pressure rolls beyond said brushes.

6. A machine for packaging sheets of

building material comprising a track along which piles of said sheets are advanced endwise in abutting contact at their ends, plates mounted above and below the path of said material, a pair of folders mounted on one of said plates and in parallel relation in alignment with the edges of the piles of material to be packaged, means for guiding continuous strips of binding material into said folders and applying adhesive to the inner faces of said strips in advance of contact with said folders, means for applying pressure to said material in its passage through said folders whereby the same is compressed as said strips are folded about opposite edges thereof, and rotary brushes mounted on said plates and in the path of the edges of the material and rotative in a direction to tension the strips transversely and to seal them against the faces of the material.

7. A packaging machine for the purpose described comprising a track along which the materials to be packaged are advanced, a pair of folding devices mounted along said track in position to be engaged by the side edges of said materials, means for guiding strips of adhesive binding material into folders, and a pair of rotary brush members mounted in the path of the material above and below said track and adapted to seal the edge portions of the strips against the faces of the packaged materials.

8. A packaging machine for the purpose described comprising a track along which the materials to be packaged are continuously advanced, a pair of folders mounted on opposite sides of said tracks and in the path of said materials, means for guiding adhesive binding strips into said folders to be thereby folded around the edges of said materials and pairs of rotary, sealing members positioned beyond said folders and acting to seal the marginal portions of the strips against the upper and lower faces of said packaged materials.

9. A packaging machine for the purpose described comprising a track along which the materials to be packaged are advanced, a pair of folding devices mounted along said track in position to be engaged by the side edges of said materials, a pair of pressure feed rolls located above and below said track and adjacent said folders, means for guiding strips of adhesive binding material edgewise into said folders and pairs of rotary brush members mounted in the path of the materials above and below said track and having brushing contact with the edge portions of the strips.

Signed at Port Clinton, Ohio, this 13th day of April, 1928.

ALBERT FRONTZ.