April 8, 1941. P. M. YEATES ET AL 2,237,537

METHOD AND MEANS OF MAKING POUCHES

Filed June 20, 1938 4 Sheets-Sheet 1

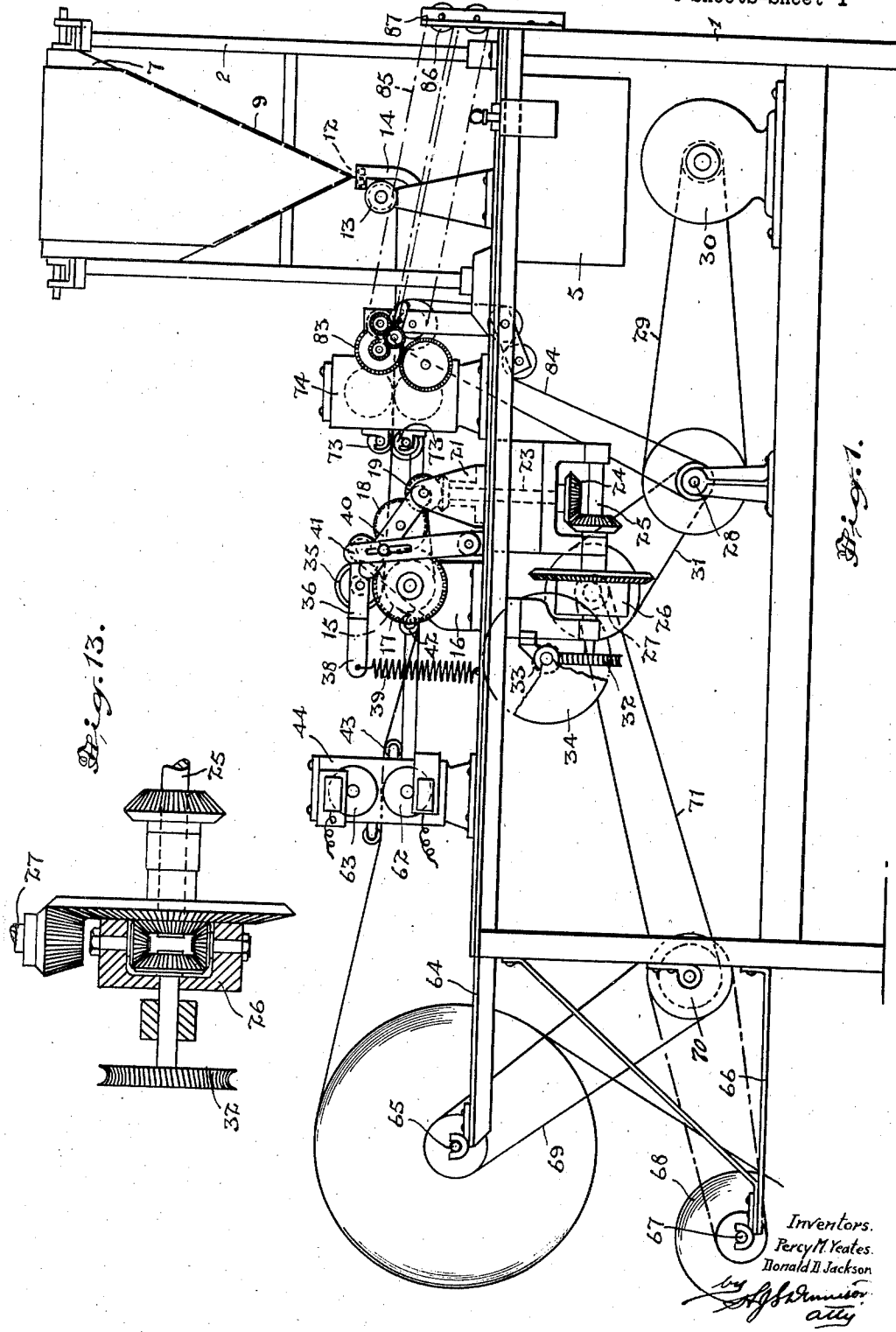

Fig. 1.

Fig. 13.

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METHOD AND MEANS OF MAKING POUCHES

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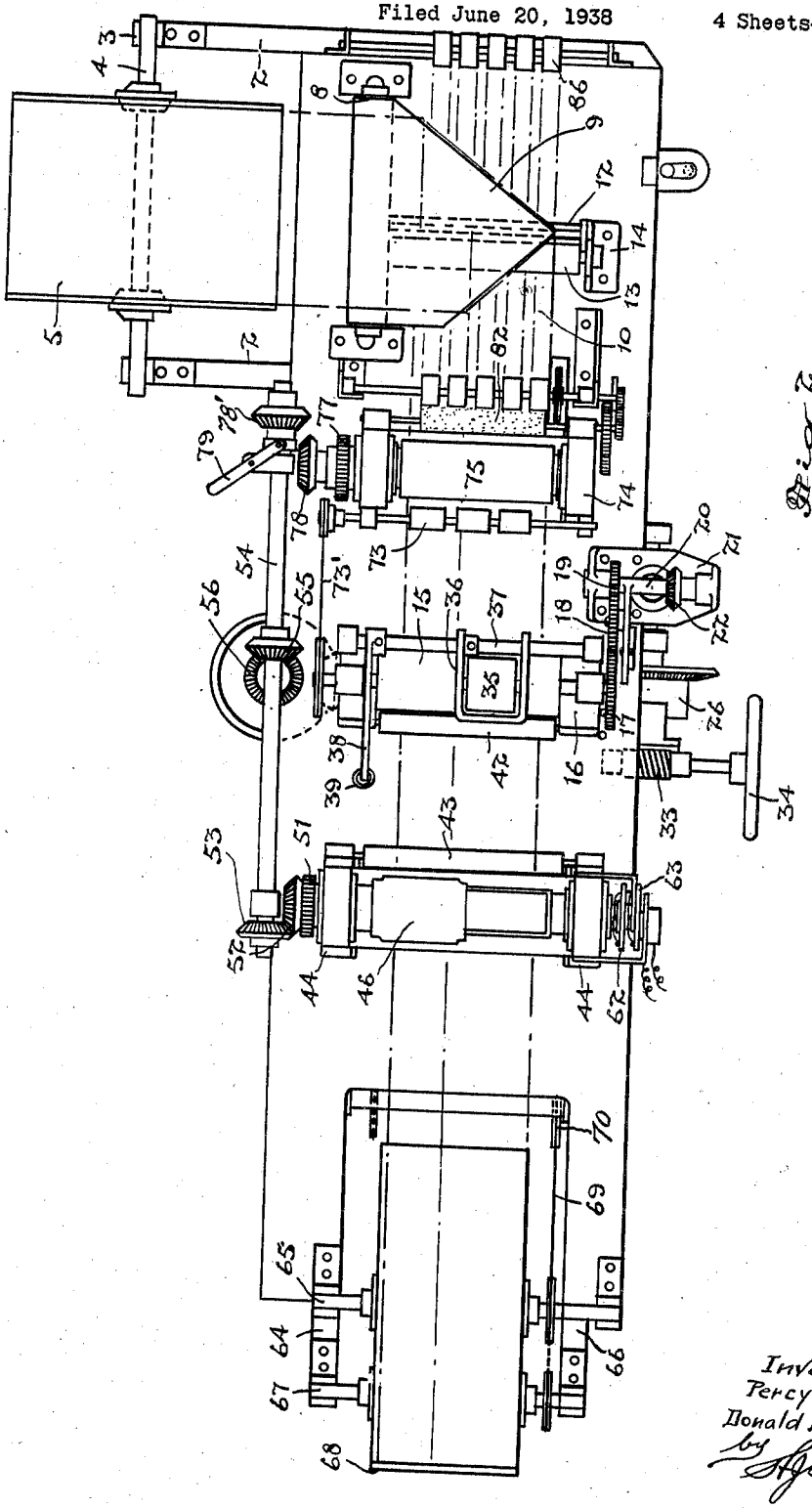

Fig. 2.

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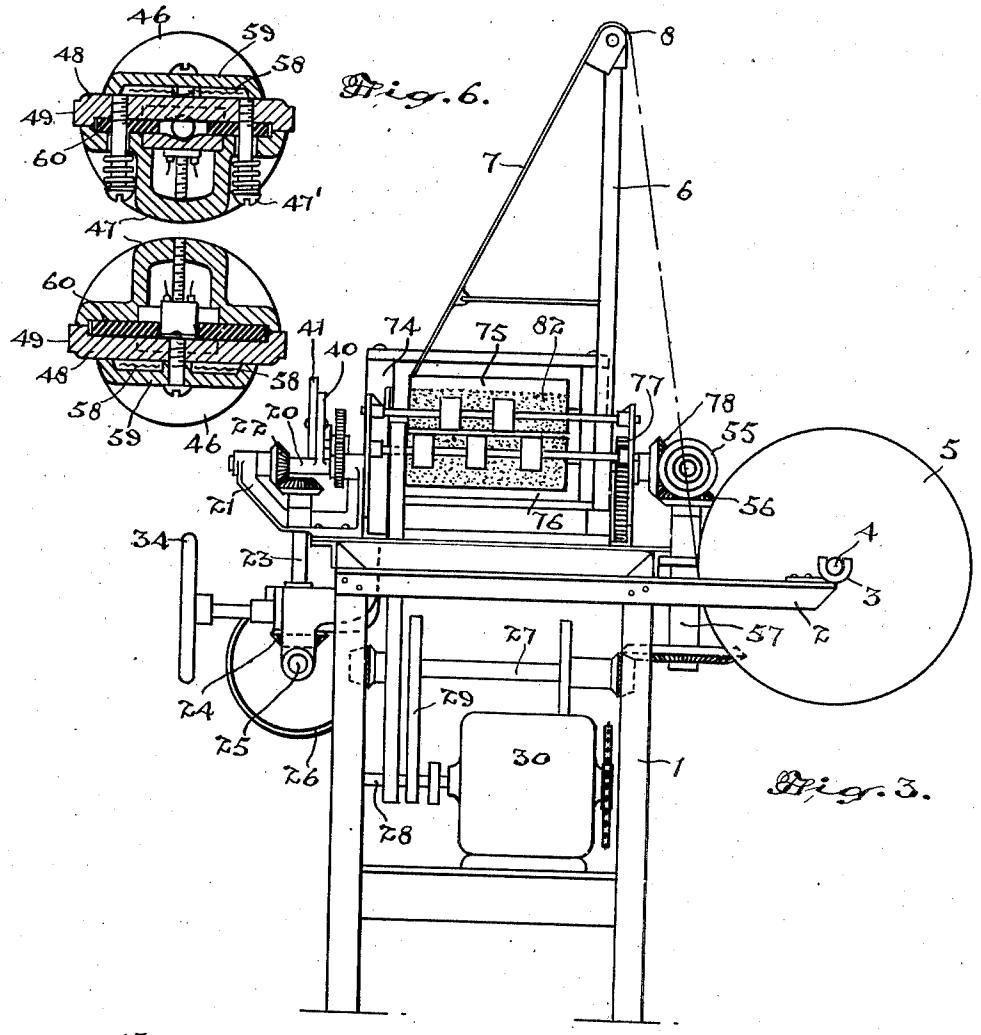

Fig. 6.

Fig. 3.

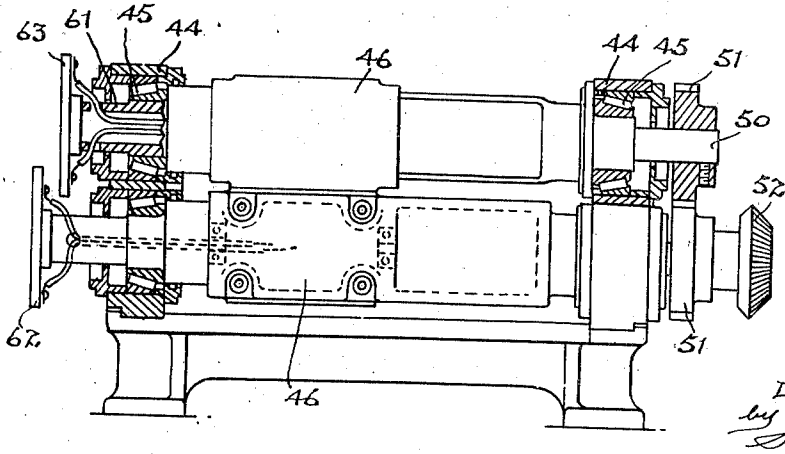

Fig. 4.

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METHOD AND MEANS OF MAKING POUCHES

Filed June 20, 1938 4 Sheets-Sheet 4

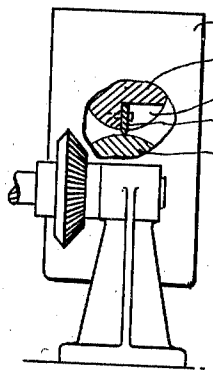

Fig. 8.

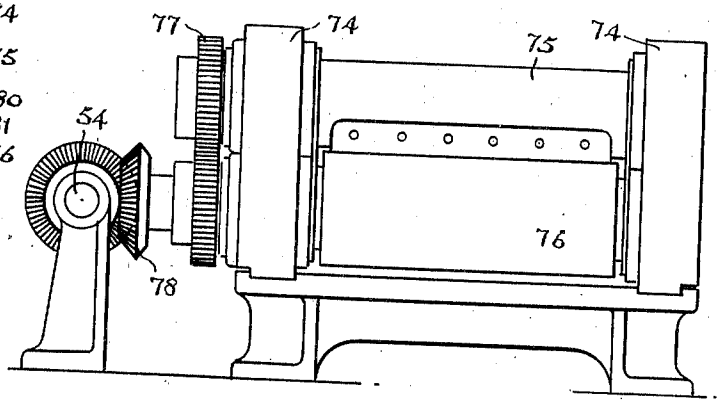

Fig. 7.

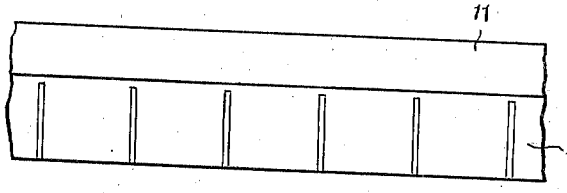

Fig. 11.

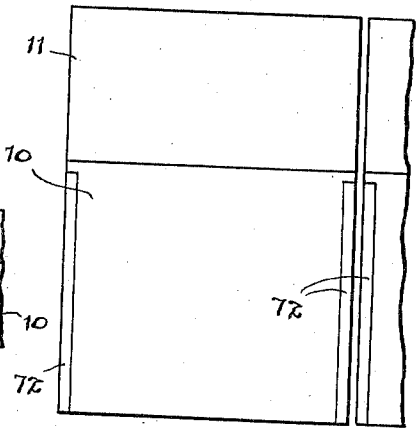

Fig. 12.

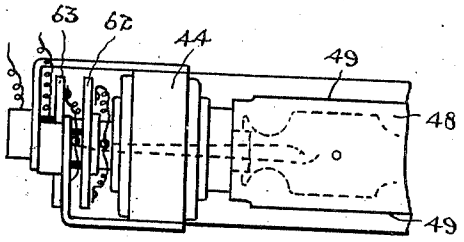

Fig. 9.

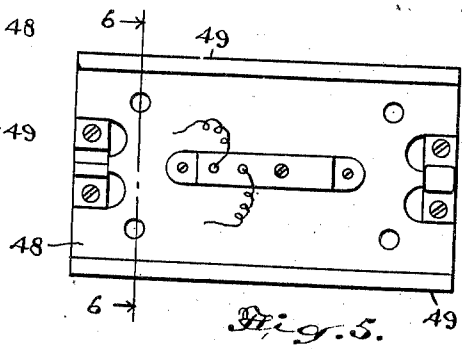

Fig. 5.

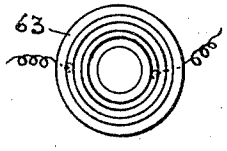

Fig. 10.

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Patented Apr. 8, 1941 2,237,537

UNITED STATES PATENT OFFICE

2,237,537

METHOD AND MEANS OF MAKING POUCHES

Percy M. Yeates and Donald D. Jackson, Toronto, Ontario, Canada, assignors, by mesne assignments, to North American Containers, Inc., New York, N. Y., a corporation of New York

Application June 20, 1938, Serial No. 214,775

11 Claims. (Cl. 93—8)

This invention relates to the manufacture of pouches such as are used for the packaging of tobacco and are required to be made of a material which will retain the natural moisture of the tobacco from evaporation and will prevent the spoiling of the contents through contact with outside moisture and the principal objects of the invention are to produce a pouch from a unitary sheet of a flexible moisture-resisting material which will be effectively sealed along the edges in a very simple and effective manner so that the contents of the pouch will be safely retained.

One of the principal features of the invention consists in the novel method of folding a continuous strip of the flexible material and sealing the overlaid portions at regular intervals by the application of pressure and heat, and then severing the folded strip midway of the width of the sealed portions providing pouches with sealed edges and an enfolding closure flap.

The other principal features consist in the novel construction of a machine whereby a strip of material is directed over a folding plate to fold the strip longitudinally and the folded strip is directed between a pair of rotating members equipped with electrically heated blades which press the folded portions of the strip together along narrow spaced areas extending transversely and seal the overlying portions together, the treated strip being then passed between rollers having means for severing the strip midway of the width of the sealed portions.

In the accompanying drawings

Figure 1 is a side elevational view of a machine constructed in accordance with this invention.

Figure 2 is a plan view of the machine.

Figure 3 is an end elevational view of the machine.

Figure 4 is an enlarged side elevation and part sectional view of the paired rotary sealing members.

Figure 5 is a plan view of one of the sealing plates.

Figure 6 is an enlarged cross sectional view through the rotary sealing members taken through the position indicated by the line 6—6 on Figure 5.

Figure 7 is an enlarged side elevation of the cutting rollers for severing the sealed portions of the folded strip.

Figure 8 is an end elevation in part section of the cutter rolls.

Figure 9 is a plan detail of one end of the rotary sealing members showing the electrical contact means for heating the blades.

Figure 10 is an end elevation of one of the contact discs of one of the rotary sealing members.

Figure 11 is a plan view of the folded and sealed strip of the pouch material.

Figure 12 is an enlarged plan view of a finished pouch.

Figure 13 is an elevational detail of the feed roll regulating gear.

In the packaging of loose materials such as tobacco, powders, and other materials which must be kept from either losing their moisture or absorbing moisture from outside contacts, it is found highly desirable to provide a pouch formed of a doubled sheet of moisture-resisting material having the end edges of the doubled portion effectively sealed.

Rubber material in the form of a very thin flexible sheet is available and is found extremely practical for the above purposes and the present invention has been devised to utilize such material, though materials other than rubber may be utilized.

The machine which has been devised for carrying the present invention into effect is illustrated in the accompanying drawings, and it comprises an elongated structural frame 1 of rectangular form having a pair of laterally extending arms 2 at one end thereof supporting journals 3 in which a spindle 4 is mounted, and which carries a roll 5 of the thin sheet material from which the pouches are made.

An upright frame 6 extends upwardly from the frame 1 adjacent to the roll 5 and this frame is provided with a downwardly sloping plate 7, the lower end of which converges in a V-shape.

The strip of sheet material passes over a roll 8 at the top of the plate 7 and folds around the V-shaped lower end 9, it being folded so that a portion 10 of about three-eighths of the total width is folded over the remaining width, thus leaving a single thickness 11 of about one-quarter of the total width.

The folded sheet passes between a pair of guide rollers 12 and under a roller 13 mounted on supports 14 and extends horizontally and passes over the feed roller 15 mounted in standards 16 arranged intermediate of the length of the frame.

It will be noted that the folded sheet passes between a pair of rollers mounted between the folding device and the feed roll, but these rollers do not function in the present step of the operation and will be described later.

The feed roller 15 is driven through a train of gears 17, 18, 19, the latter being mounted on

a jack shaft 20 journalled in a bracket 21 mounted on the frame. The jack shaft is driven through the bevel gears 22 from a vertical shaft 23, the lower end of which is provided with a bevel gear 24 arranged upon a horizontally mounted shaft 25. The shaft 25 is driven by a differential gear 26 which in turn is driven from a shaft 27 extending transversely of the frame 1 (see Figure 13).

A jack shaft 28 extending across the machine, is driven through a belt 29 from a motor 30 and the shaft 27 is driven by a belt 31 from said jack shaft.

The shaft 25 has mounted at its forward end a worm wheel 32 which meshes with a worm 33 provided with a hand wheel 34 which is utilized to adjust the feed roller through the differential gear to advance or retard the strip passing thereover, as will be further described.

A roller 35 mounted in a U-shaped arm 36 carried on a spindle 37 extending between the feed roller standards 16 bears upon the overfolded portion of the folded strip and is held in close engaging contact by an arm 38 secured to the spindle 37 and held down by a spring 39 secured to the frame.

It will be noted that the gear 18 between the feed roll gear 17 and the gear 19 is mounted on a pivotal arm 40 which is adjustably supported by a slotted strut arm 41 mounted on the frame.

A small guide roller 42 is arranged about midway of the height of the feed roller and the folded strip after passing over the feed roll passes under the guide roller and then passes over a guide roller 43 extending across the frame and mounted on the standards 44.

A pair of vertically superposed roller bearings 45 are arranged in each of the standards 44, and in each set of bearings is mounted a rotary heater device 46 between which the folded strip is directed (see Figure 4).

Each of the heater devices is formed with a transversely arched section 47 to which is clamped by the screws 47' a plate 48, each of said plates being formed with parallel edge portions 49, which are adapted on the rotation of the heaters to be brought into close registering alignment, as seen in Figure 4. The adjacent edges of the opposed plates do not meet, but are spaced apart sufficient to grip and compress between them the folded strip of material.

Each rotary heater member is provided with a shaft extension 50 upon which is mounted a spur pinion 51 and these pinions intermesh and are driven by a bevel gear 52 meshing with a gear 53 mounted on a shaft 54 arranged longitudinally of the frame 1. This shaft is driven by bevel gears 55 and 56 from a vertical shaft 57 which in turn is geared to the shaft 27 driven from the motor.

Each of the heater plates 48 has mounted on its outward side an electric heater element 58 clamped in position by a plate 59 (see Figure 6). Insulating plates 60 are arranged between the plate 48 and the arched supporting section to concentrate the heat of the electric heaters in the plates 48. Suitable thermostatic switches are arranged in each of the rotary heaters to regulate the temperature of the sealing plates.

The electric leads from the heater elements are carried through hollow trunnions 61 (Figure 4) to contact rings 62 (Figure 10) mounted on the discs 63 arranged on the outer ends of the rotary members, said rings being engaged by suitable brush contacts connected with electric lead wires.

A pair of arms 64 extend from the frame 1 adjacent to the rotary sealing devices and carry a spindle 65 upon which the continuous strip of pouch material is wound.

A pair of arms 66 are arranged below the arms 64 and carry a spindle 67 upon which a paper roll 68 is mounted. The web of paper from the roll is wound in with the pouch material to separate the succeeding layers as they are received from the rotary sealers.

The spindles 65 and 67 are suitably driven by a belt 69 extending around pulleys on the spindles and driven from a pulley 70 mounted on a jack shaft. The belt is shifted to drive either of the spindles according to whether the material is being rolled or unrolled and each spindle is fitted with a suitable friction brake. The pulley 70 is driven by a belt 71 carried from a pulley on the shaft 27.

In the operation of the mechanism described the feed roller 15, the rotary sealing members and the winding roll are all driven in unison, the flat strip of pouch material is drawn downwardly over the folder 7 and through the guide rolls to the feed roll 15 and between the rotary sealers, where the folded strip is engaged at intervals by the meeting edges of the heater plates 48 and sealed, from whence the strip is wound, with an intermediate paper strip on the spindle 65.

When the roll of pouch material has been subjected to the folding and sealing operation, it is then necessary to divide the strip into individual pouches which is accomplished by severing the folded and sealed strip transversely along the center of the sealed portions 72 so that half of each sealed strip forms the sealed edges of the pouch as indicated particularly in Figure 12.

In order to accomplish the severing of the folded strip, the said strip is passed under the rotary sealing devices and over the feed roller 15 from whence it passes between a pair of feed rollers 73 mounted on standards 74 carried on the frame 1 between the folder and the feed roll, and operated by a belt 73' driven from the main feed roller 15.

A pair of rollers 75 and 76 (Figures 7–8) are mounted on shafts journalled in the standards 74 and these rotate in unison in a direction reverse to the direction of rotation of the rotary sealing means, each having intermeshing spur gears 77, the shaft of the lower roller being driven by a bevel gear 78 which is in turn driven by a bevel pinion 78' mounted on the shaft 54 and moved into and out of mesh with the cutter rolls by a lever 79.

The upper roller 75 is formed with a longitudinal recess 80 thereon and a cutter blade 81 is mounted therein radial to the roller, and adjusted so that its cutting edge meets the surface of the roller 76. The folded pouch strip is fed between the rollers 75 and 76, and their diameter is such that at each revolution as the cutter contacts with the mating roller the blade engages the folded pouch strip along the middle of the transverse sealed portion and cuts it cleanly.

When the individual pouches are being severed from the strip, it is necessary to provide means for overcoming the static electricity generated and to clear the strip end from the cutter rolls. This is accomplished by arranging a pair

of rotary brushes 82 closely adjacent to the rolls. The brushes 82 are driven by an intermeshing pair of gear pinions 83 driven by a belt 84 operated from the jack shaft 28.

A set of belt conveyors 85 are arranged to convey the individual pouches as they are delivered by the brushes 82 from the cutter rolls. These conveyors are suitably driven from the gears operating the brushes 82 and extend to rollers 86 supported on brackets 87 mounted on the end of the frame 1.

It will be understood that the transversely sealed pouch strip is fed by the feed roller in unison with the cutter rollers and that the operation of cutting the entire roll of pouch material will be carried out very expeditiously and the individual pouches will be delivered by the endless belt conveyors so that they may be readily handled by an attendant.

The operation of the machine is extremely simple and it operates with such rapidity as to fold, seal and cut an extraordinary quantity of pouches in a brief period of time, turning same out in a uniform and highly desirable manner.

What we claim as our invention is:

1. In apparatus of the class described in which a heat-sealable strip is folded, heat-sealed and severed in the sealed zones, the combination of sealing and cutting devices and reversible strip-feeding means interposed between said sealing and cutting devices and selectively operable to advance the strip to either of said devices in accordance with the operation to be performed.

2. In apparatus of the class described in which a heat-sealable strip is folded, heat-sealed and severed in the sealed zones, the combination of sealing and cutting devices, and reversible strip-feeding means interposed between said sealing and cutting devices and selectively operable to advance the strip to either of said devices in accordance with the operation to be performed, said feeding means including a rotary member disposed intermediately between said sealing and cutting devices, a common drive means, and selective drive means interposed between said common drive means and said sealing and cutting devices and said feeding means to selectively drive either one in accordance with the direction of travel of the strip desired and/or the operation to be performed.

3. Apparatus as claimed in claim 1 in which said feeding means includes a main roller spaced between said sealing and cutting devices and secondary feed rollers disposed between said main roller and said cutting devices, means forming a drive connection between said first and second-mentioned feed rollers, and means for rendering said first-mentioned feed roller effective in advancing the strip in the direction of said sealing means.

4. Apparatus as claimed in claim 1 in which said feeding means includes a main roller spaced between said sealing and cutting devices and secondary feed rollers disposed between said main roller and said cutting device, means forming a drive connection between said first and second-mentioned feed rollers, and means for rendering said first-mentioned feed roller effective in advancing the strip in the direction of said sealing means, said latter means including a pressure roller displaceable bodily toward said first-mentioned roller or away therefrom to frictionally engage the strip therewith or disengage the same therefrom.

5. In an apparatus of the class described having means for storing and releasing a strip of heat-sealable material, heat-sealing means and severing means of the rotary type respectively co-operative with the strip as it is passed to and from said storing means, a main drive shaft, and means for connecting said drive shaft with said heat-sealing and severing means.

6. In an apparatus of the class described having means for storing and releasing a strip of heat-sealable material, heat-sealing means and severing means of the rotary type respectively co-operative with the strip as it is passed to and from said storing means, a main drive shaft, means for detachably connecting said drive shaft with said severing means, a feed roller journalled between said rotary sealing and severing means, and means forming a selective drive connection between said feed roller and said main drive shaft.

7. In an apparatus of the class described having means for storing and releasing a strip of heat-sealable material, a heat-sealing unit and a severing unit each of the rotary type, said units being respectively co-operative with the strip as it is passed to and from said storing means, a main drive shaft, means for detachably connecting said drive shaft with one of said units, a feed roller journalled between said rotary sealing and severing units, means forming a selective drive connection between said feed roller and said main drive shaft, including a train of gears connected to said feed roller, at least one of said gears being mounted on a pivotally mounted arm adapted to be swung to move the gear into and out of engaging contact with one of said gears, and means for supporting said arm in adjusted positions.

8. In an apparatus of the class described having means for storing and releasing a strip of heat-sealable material, heat-sealing means and severing means of the rotary type selectively operable as the strip is passed to and from said storing means respectively, a main drive shaft, means for operatively connecting said drive shaft with said heat-sealing and severing means, a feed roller journalled between said rotary sealing and severing means, means forming a selective drive connection between said feed roller and said main drive shaft, including a train of gears connected to said feed roller, at least one of said gears being mounted on a pivotally mounted arm adapted to be swung to move the gear into and out of engaging contact with one of said gears, a second arm pivotally mounted in spaced relation to the pivotal mounting of the first-mentioned arm and overlapping same, and an adjustable slot and pin connection between said arms.

9. In an apparatus of the class described having means for storing and releasing a strip of heat-sealable material, heat-sealing means and severing means of the rotary type selectively operable as the strip is passed to and from said storing means respectively, a main drive shaft, means for operatively connecting said drive shaft with said heat-sealing and severing means, a feed roller journalled between said rotary sealing and severing means, means forming a selective drive connection between said feed roller and said main drive shaft, a rocking spindle mounted parallel to the feed roller axis having lateral extensions over the feed roller, a pressure roller in said extensions adapted to bear downwardly to press the strip against the feed roller, an arm extension from said spindle, and a tension spring co-operating with said arm extension to rock

said spindle in a direction to resiliently urge said pressure roller toward said feed roller.

10. In an apparatus of the class described, in combination, means for advancing a continuous pouch-forming strip, means for severing said strip into pouch units, a pair of rotary brushes mounted adjacent to said severing means adapted to engage the edge of the strip advanced therethrough, and endless carriers extending beyond said brushes to receive the pouch units from the rotary brushes and carry the same away in progression.

11. In apparatus of the class described having means for rolling and unrolling a strip of heat-sealable pouch-forming material, the combination of heat-sealing and severing means for respective cooperation with said strip in its rolling and unrolling movement, means for operating said heat-sealing means independent of said severing means during the rolling of said strip and for operating said severing means during the unrolling of said strip.

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