Oct. 18, 1960 J. R. GAINES ET AL 2,956,612

PACKET APPLYING MACHINE

Filed Sept. 12, 1957 4 Sheets-Sheet 1

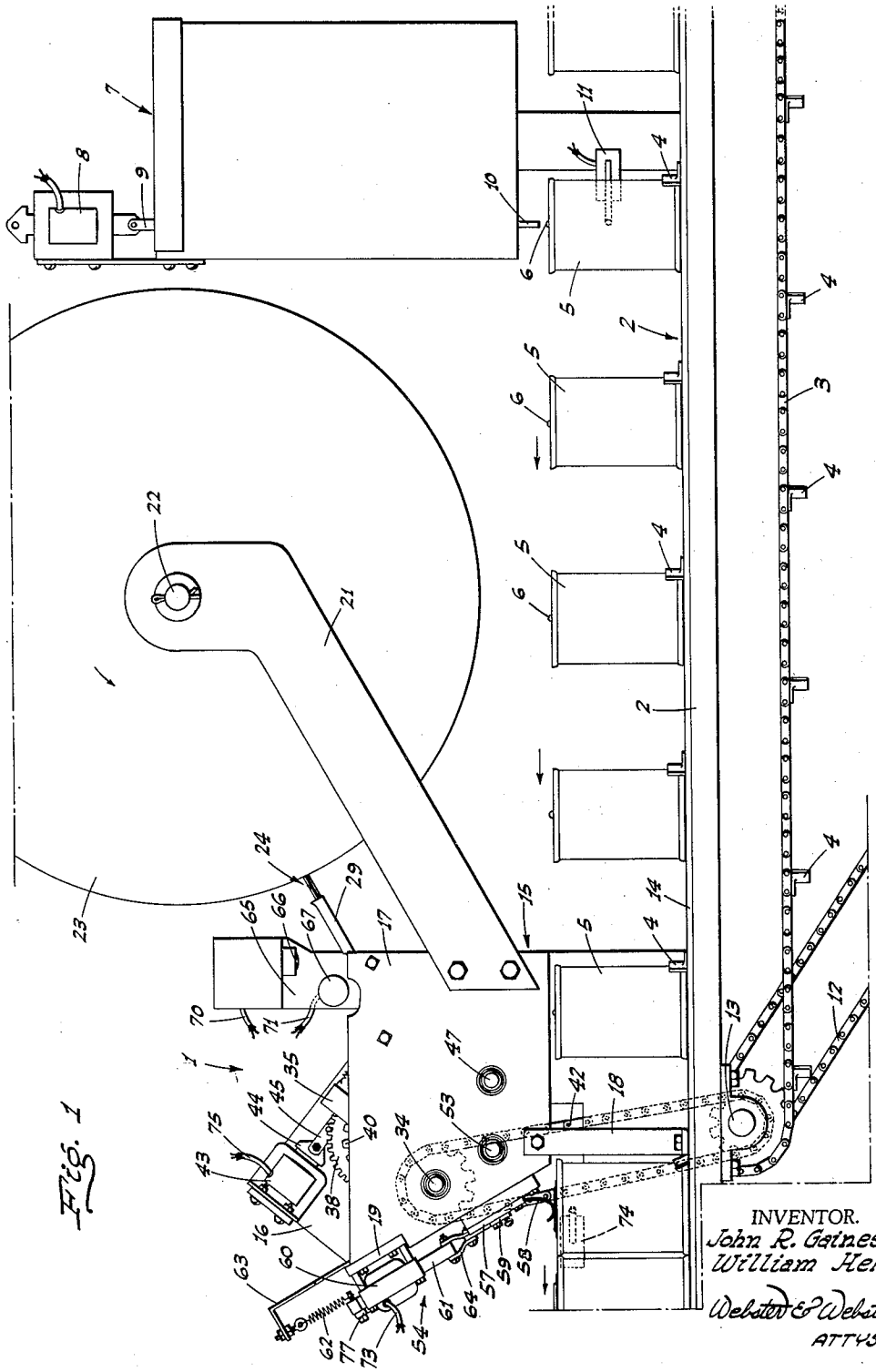


Fig. 1

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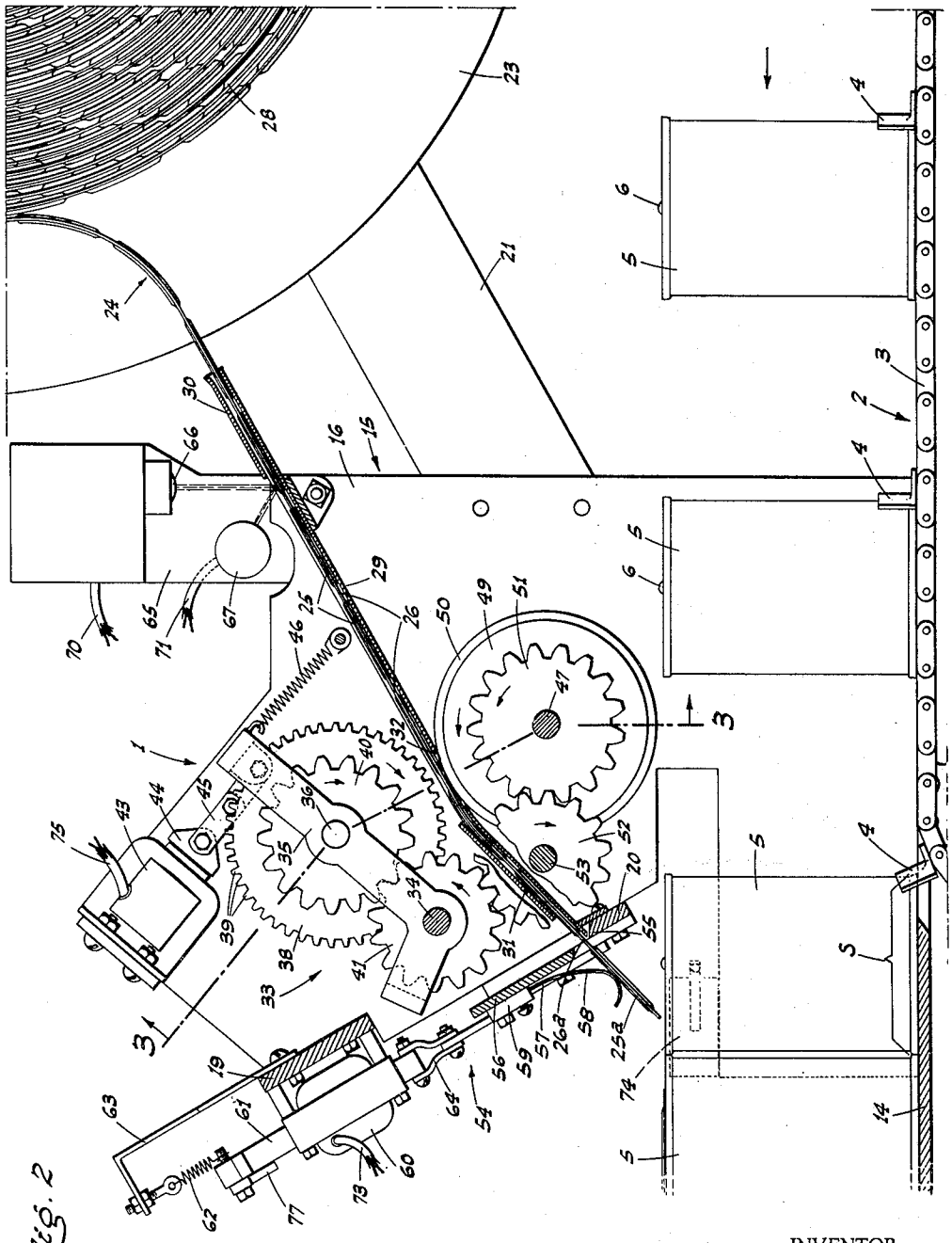


Fig. 2

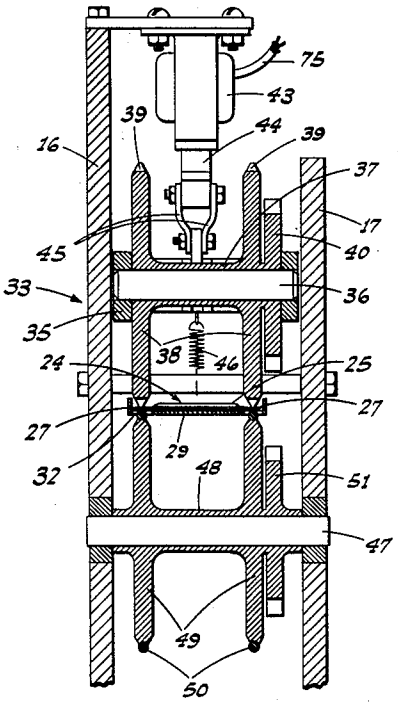
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Fig. 3



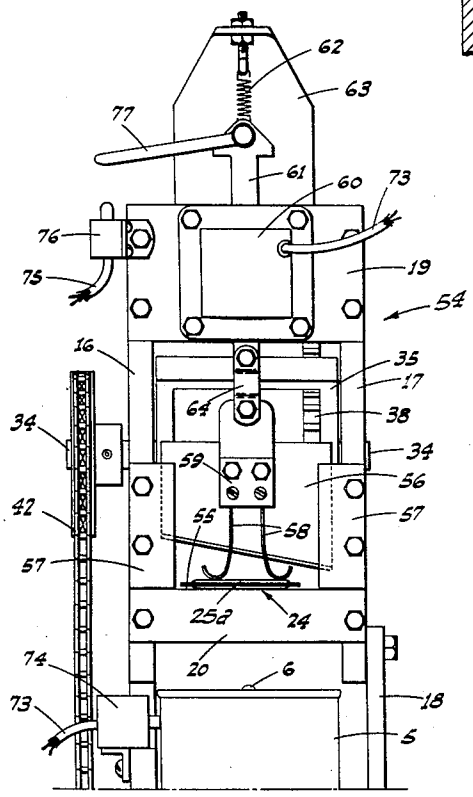


Fig. 4

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Fig. 5

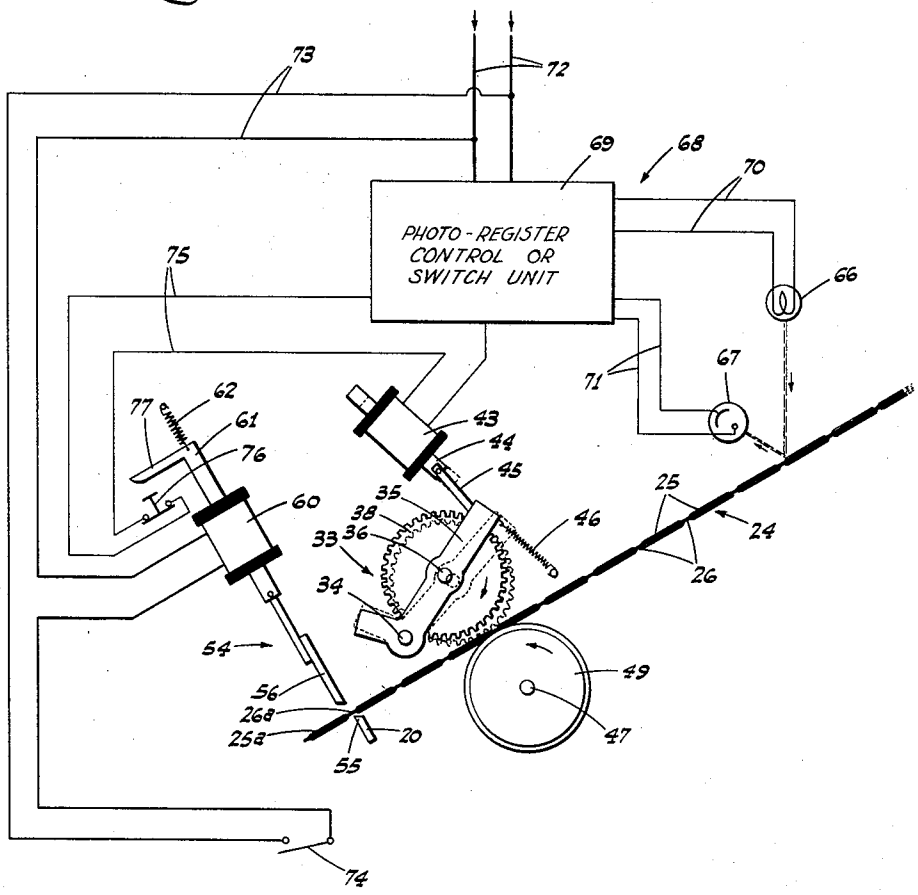
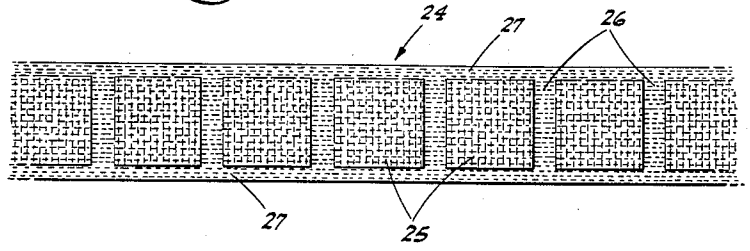


Fig. 6



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PACKET APPLYING MACHINE

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2 Claims. (Cl. 154—1.6)

The present invention is directed to, and it is a major object to provide, a novel machine operative to automatically and successively apply a small envelope or packet exteriorly to each of a multiplicity of containers as moved by a conveyor past a predetermined point; the containers being—for example—cans of food, while the envelopes or packets may contain an additive—such as vitamin material in powder form—adapted to be mixed with the food after the can is opened and such food is removed therefrom.

Another important object of this invention is to provide a packet applying machine for use with packets which are initially in an endless coiled strip; the machine being operative to recurringly advance the strip so as to dispose the lead packet at the aforesaid predetermined point, and to then cut off said lead packet and deposit it on the end of a can passing such point. The packet receiving end of each can carries a spot of pre-applied adhesive to retain the deposited packet in place.

An additional object of the invention is to provide a packet applying machine, as above, which includes a novel electro-mechanical mechanism for automatically controlling the cyclic movements of the several working parts of the machine; such mechanism including an electric eye assembly responsive to differential in color between the face of the packets and the connecting webs therebetween in the strip.

A further object of the invention is to provide a packet applying machine, as above, which embodies a novel, power actuated drive unit for accomplishing the recurrent advancing of the strip of packets; said strip drive unit—together with the packet cut-off unit which the machine also includes—being associated with, and caused to work by, corresponding solenoids.

A still further object of the invention is to provide a packet applying machine, as above, in which the electric eye assembly, and the solenoids for the strip drive unit and the packet cut-off unit, are connected in an effective control circuit arrangement responsive—in certain sections thereof—firstly to movement of each can passing the packet-receiving point, secondly to actuation of the cut-off unit, and thirdly to operation of the electric eye assembly; all whereby to cause the automatic and cyclic operation of such machine.

It is also an object of the invention to provide a packet applying machine, of the type described, which—while relatively simple in structure, and thus capable of being readily manufactured with economy—is positive, smooth, and accurate in operation.

Still another object of the invention is to provide a practical, reliable, and durable packet applying machine, and one which will be exceedingly effective for the purpose for which it is designed.

These objects are accomplished by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings:

Fig. 1 is a side elevation of the packet applying machine as in use; the view showing a cut-off packet at the moment of its application to the top of a can passing the receiving station.

Fig. 2 is an enlarged fragmentary longitudinal sectional elevation of the machine; the view showing the lead packet in position to be cut off from the strip and deposited on the end of a can passing said receiving station.

Fig. 3 is a fragmentary transverse sectional elevation on line 3—3 of Fig. 2.

Fig. 4 is a front end elevation of the machine.

Fig. 5 is a diagrammatic view illustrating the circuit arrangement.

Fig. 6 is a fragmentary plan view of a section of the strip of packets.

Referring now more particularly to the drawings, and to the characters of reference marked thereon, the packet applying machine, illustrated generally at 1, is adapted to be mounted in connection with a can conveyor 2 which includes an endless conveyor chain 3 fitted with pusher lugs 4 operative to advance cans 5 in a lineal horizontal row wherein such cans are equi-distantly spaced.

The cans are disposed on end on the conveyor 2, and at a point behind the packet applying machine 1 a spot 6 of adhesive is automatically applied centrally to the top of each can as it passes such point; this being accomplished by an adhesive feeder, indicated generally at 7, and which includes a solenoid 8 arranged to actuate a plunger 9. Each time that the plunger 9 is actuated a small quantity of the adhesive is permitted to discharge from a tube 10 on the bottom of the feeder 7; the discharged adhesive falling centrally on top of an adjacent can 5. To attain proper timing each can 5, as it reaches a position for adhesive reception, engages and actuates a switch 11 interposed in a suitable energizing circuit (not shown) for the solenoid 8.

After the spot 6 of adhesive is applied centrally to the top of each can 5, the row of the cans moves forwardly on the conveyor 2, and which conveyor is actuated by a constantly driven, endless chain 12 connected to the forward cross shaft 13 of said conveyor 2.

Shortly before the engaged pusher lug 4 escapes each can 5, the latter rides onto the adjacent end of a platform 14 and passes what may be termed the packet receiving station, indicated at S in Fig. 2. As each can passes such packet receiving station S, the packet applying machine 1 comes into play; such machine being constructed and functioning as follows:

A mounting frame, indicated generally at 15, is disposed above the forward portion of the conveyor 2, and comprises transversely spaced side plates, indicated at 16 and 17, respectively; the side plate 16 extending downwardly to connection with the conveyor 2 on one side thereof, while the other side plate 17 terminates at its lower edge above the opposite side of said conveyor 2, but is supported therefrom by a post 18. The upper portion of the side plate 16 projects above the upper edge of the side plate 17 in order to carry certain of the working parts, as will hereinafter appear.

The side plates 16 and 17 are connected at the front by a top cross plate 19 and another cross plate 20 disposed some distance therebelow but clear of cans passing between side plate 16 and post 18.

A pair of transversely spaced supporting arms 21 are fixed to the side plates of the mounting frame 15 and extend at an upward and rearward incline, and such arms 21 carry—at their rear ends—a cross shaft 22 on which a relatively large-diameter reel 23 is turnable; the forward inclination of the arms 22 and the diameter of the reel 23 being such that said reel clears the row of cans 5 on the conveyor 2.

The reel 23 carries a relatively long, coiled packet

strip, indicated generally at 24. Such strip includes relatively small rectangular envelopes or packets 25 containing the material intended as a subsequent additive for the food or the like in the cans 5. The packets 25, formed initially as an integral part of the strip 24, are equi-distantly spaced therealong, and the strip connects adjacent packets by means of integral webs 26. Additionally, the width of the packets 25 is such that they leave a flat margin 27 on each side of said strip 24, and the purpose of these margins 27 will hereinafter appear.

The packet strip 24—which is coiled on the reel 23, and which coil is indicated at 28—feeds off the top of the latter and thence extends at a forward and downward incline through the mounting frame 15 between the side plates 16 and 17, being supported by a guide channel 29 secured in said mounting frame.

At its upper and lower ends the guide channel 29 includes top cross members 30 and 31, respectively, which form throats through which the packet strip 24 feeds in guided relation.

At a point intermediate the front and rear of the mounting frame 16 the guide channel 29 is formed in the bottom, and adjacent opposite sides, with longitudinal slots 32, the transverse spacing of which slots is such that they register with the flat margins 27 of the packet strip 24 in said guide channel 28. See Fig. 3.

A packet strip drive unit, indicated generally at 33, and which is adapted to work in engagement with the margins 27 of the packet strip 24 in the zone of said slots 32, is constructed as follows:

Such packet strip drive unit 33 comprises a cross shaft 34 which extends between the side plates 16 and 17 above the lower part of the guide channel 29; such cross shaft 34 providing the bearing for an upwardly and rearwardly inclined, vertically swingable yoke 35 fitted—intermediate its ends—with a cross shaft 36.

Within the confines of the yoke 35 the shaft 36 provides the journal for the integral hub 37 of transversely spaced sprocket-type wheels 38, and the transverse spacing of which wheels is the same as that of the slots 32 in channel 29 and the margins 27 of the packet strip 24.

The disposition of the parts is such that upon lowering of the yoke 35 from an initially raised position to a lowered position the teeth 39 of the sprocket-type wheels 38 ride said margins 27 of the packet strip 24 directly above the slots 32.

The sprocket-type wheels 38 are constantly driven, with the lower portion thereof traveling forwardly, by means of a gear 40 on cross shaft 36 meshing with a pinion 41 on cross shaft 34; the latter shaft being constantly actuated by means of an endless chain and sprocket unit 42 which derives its motion from the forward cross shaft 13 of conveyor 2.

The yoke 35 is normally maintained in its raised position, with the sprocket-type wheels 38 clear of the margins 27, by means of a then energized solenoid 43 mounted on the top of the side plate 16, with the plunger 44 of such solenoid connected by linkage 45 to such yoke 35 at its free end. A tension spring 46, connected between said free end of the yoke 35 and a lower point on the side plate 16, imparts a yieldable pull-down force to said yoke.

In order to provide an effective backing for the margins 27 of the packet strip 24 as said margins traverse the slots 32, and when the sprocket-type wheels 38 are lowered into driving engagement with such margins, the following arrangement is provided:

A cross shaft 47 is journaled between the side plates 16 and 17 below the guide channel 29, and such cross shaft 47 is fitted with a hub 48 carrying transversely spaced friction wheels 49 vertically alined with the sprocket-type wheels 38; such friction wheels 49 each being peripherally resilient, and which is accomplished by soft rubber rings 50.

The position of the cross shaft 47 and the diameter of the friction wheels 49 are such that the adjacent portion of the periphery of such wheels 49 works through the slots 32. The friction wheels 49 are driven—so as to turn forwardly at the top, and at the same speed as the sprocket-type wheels 38—by a gear 51 on cross shaft 47, and a pinion 52 on a cross shaft 53; the pinion 52 meshing between pinion 41 and said gear 51.

When the yoke 35 is in its raised position, with the sprocket-type wheels 38 clear of the margins 27, there is not sufficient engagement of the friction wheels 49 with said margins 27 to cause any advance of the packet strip 24. However, upon deenergization of the solenoid 43, the spring 46 pulls the vertically swingable yoke 35 downwardly until the teeth 39 of the sprocket-type wheels 38 engage the margins 27 of the packet strip 24, and urge such margins into close driven engagement with the peripheral portions of the friction wheels 49 which work through said slots 32.

In this manner the packet strip 24 is effectively advanced to project the lead packet, indicated at 25*a*, out of the forward end of the guide channel 29 and to a position for cut-off directly above a can 5 passing the packet receiving station S. In this position, the lead packet 25*a* is severed from the packet strip 24 by a packet cut-off unit, indicated generally at 54, which slopes at a downward and rearward incline at the front of the mounting frame 15, and is constructed and functions as follows:

The cross plate 20 is sharpened at its upper edge so as to form a fixed or lower cutting knife 55 which lies directly and centrally below the packet strip web 26*a* immediately behind the projected lead packet 25*a*.

A vertically reciprocable upper cut-off knife 56 is carried in guides 57 for downward motion from a normally raised position above the fixed or lower cutting knife 55; such upper knife 56 being operative—on its lowering stroke, and in cooperation with the fixed knife 55—to sever the web 26*a*. When this occurs, and upon continuance of the down stroke of the upper knife 56, the severed lead packet 25*a* falls onto the top of the can 5 passing the packet receiving station; such severed packet 25*a* being pressed firmly into contact with the spot 6 of adhesive by a pair of relatively flexible spring fingers 58 which are attached to—and travel with—the knife 56. The spring fingers 58, which are curved on their lower ends, as shown, are attached at their upper ends to said knife 56 by a securing block 59.

The vertically reciprocable upper cut-off knife 56 is adapted to be actuated as follows:

A solenoid 60 is mounted on the top cross plate 19, and such solenoid includes a plunger 61 which extends therethrough from top to bottom, and projecting at both ends. The solenoid 60 is normally deenergized, with the plunger 61 pulled upwardly by means of a tension spring 62 connected between the upper end of said plunger 61 and the top of an upstanding bracket 63.

At its lower end the plunger 61 is connected to the upper portion of the knife 56 by linkage 64. Upon energization of the solenoid 60, the plunger 61 drives downwardly against the tension of the spring 62, imparting lowering, packet cut-off motion to said knife 56. Thereafter, when the solenoid 60 is deenergized, the tension spring 62 again acts to return the plunger 61 and the knife 56 to raised, starting position.

At the rear upper corner thereof the mounting frame 15 is fitted with an upstanding bracket 65 on which is mounted the spot lamp 66 and the photo-cell 67 of an electric eye assembly, indicated generally at 68. The spot lamp 66 is disposed to direct its beam of light downwardly onto the face of the packet strip 24 in the guide channel 29, and so that such beam of light is reflected back into the photo-cell 67; the electric eye assembly 68 including—in addition to the spot lamp 66, and photo-cell 67—a photo-register control or switch unit 69 to which said spot lamp and photo-cell are connected by an

energizing circuit 70 and a photo-cell circuit 71, respectively.

An electric current supply circuit 72 feeds the photo-register control or switch unit 69, and also feeds an energizing circuit 73 for the solenoid 60; such energizing circuit 73 having a normally open switch 74 interposed therein. The switch 74 is secured to the front of the mounting frame 15 in position such that said switch 74 is engaged, momentarily closed, and then permitted to open by the side of each can 5 as it passes the packet receiving station S. The engaged pusher lug 4 falls away from each can 5 only after such can has had a packet applied thereto at station S and moves ahead a distance—though slight—sufficient to allow switch 74 to open.

An energizing circuit 75 for the solenoid 43 leads from the photo-register control or switch unit 69, which unit normally maintains said circuit 75 live so that said solenoid 43 then maintains the sprocket-type wheels 38 raised and the packet drive unit 33 out of operation.

A normally closed switch 76 is interposed in said energizing circuit 75, and such switch 76 is attached to the front of the mounting frame 15 at a point such that it is engaged and opened by a laterally projecting finger 77, on the plunger 61, each time that the latter moves downwardly.

While opening of the switch 76 by the finger 77 is only momentary, the energizing circuit 75—as controlled by the unit 69—then remains open until reenergized by said unit upon a certain response of the photo-cell 67, as hereinafter described.

Operation

In operation of the above described packet applying machine each can 5, as it passes the packet receiving station S, momentarily closes the switch 74 as indicated in Fig. 6. Upon switch 74 being closed, the solenoid 60 is energized and the packet cut-off unit 54 functions, in the manner previously described, to cut off the lead packet 25*a* and to deposit such cut-off packet on the upper end of the can 5 passing said packet receiving station S.

The instant that the packet cut-off unit 54 functions, switch 76 is opened, which breaks the energizing circuit 75 of the solenoid 43, whereupon the packet strip drive unit 33 functions—including lowering of the sprocket-type wheels 38—to advance the packet strip 24 in the guide channel 29 a distance equal to the length of one packet and one web; i.e., the next packet to be applied being fed out over the lower knife 55 until it occupies exactly the same position as did the first lead packet 25*a*.

At such time the electric eye assembly 68 functions to reenergize circuit 75, whereupon solenoid 43 takes the packet strip drive unit 33 out of play. The photo-register control or switch unit 69 so acts to reenergize circuit 75 in response to a decrease in light reflection from the packet strip 24. This is accomplished because of the fact that the packet strip 24 on its face is generally of a bright metallic silver color, whereas the face of each packet 25 is a darker color, such as yellow. Hence, as the packet strip drive unit 33 advances the packet strip 24, the photo-cell 16 will receive a relatively strong light reflection from a web 26, followed by a decreasing reflection from the following packet. When this occurs the unit 69—which is substantially conventional, and the details of which form no part of this invention—responds and re-sets the circuit 75 to an energized condition.

It will thus be recognized that the electric eye assembly 68 is employed to positively and accurately stop advance of the packet strip 24 after each leading packet 25*a* has been run out ahead of the lower knife 55 the exact distance required, and in the precise position for severing of web 26*a* by the packet cut-off unit 54.

Generally, therefore, in the automatic and cyclic operation of the machine, the packet cut-off unit 54 responds to a can passing the packet receiving station S; the packet strip drive unit 33 then responds to actuation of said packet cut-off unit 54; and finally the electric eye assembly 68 responds to movement of the packet strip 24 to take said packet strip drive unit 33 out of operation after such packet strip has advanced the desired amount for the next packet cut-off and applying operation.

It will thus be recognized that the described packet applying machine will effectively and positively function to cut off and apply a packet 25—from a strip 24—to each can 5 as it passes the packet receiving station S; each applied packet being pressed down into the applied spot 6 of adhesive by the spring fingers 58 upon the downstroke of the cut-off knife 56.

From the foregoing description it will be readily seen that there has been produced such a device as will substantially fulfill the objects of the invention, as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described the invention, the following is claimed as new and useful, and upon which Letters Patent are desired:

1. A machine for applying a packet to the top of each of a row of containers in succession from an initially continous strip wherein the packets are in longitudinal row order; said machine comprising a conveyor to advance each container in turn to a packet-receiving station, a guide channel in which the packet strip is supported for advance to position the lead packet directly above and relatively close to the container at said station, said channel terminating immediately behind said lead packet when so positioned, means to intermittently advance the strip to dispose successive packets in such position, means including a downwardly movable knife to sever the lead packet from the strip in timed relation to the intermittent advance of the strip, said severed packet then dropping by gravity onto the top of the container at said station, and a yieldable pressing finger mounted in connection with the knife for downward movement therewith and disposed at a level below the same to engage and press the severed packet onto the container.

2. A machine, as in claim 1, the packets being disposed on the strip clear of the side edges thereof and said strip advancing means comprising a pair of driven friction wheels below the strip guide channel and positioned to engage the under side of the strip to the sides of the packets, and means to intermittently press down on the strip from above and in alinement with the point of engagement of the wheels therewith whereby to cause said wheels to frictionally engage the strip; said last-named means comprising a pair of toothed wheels above the strip and friction wheels and disposed in vertical alinement with the latter, means driving said toothed wheels in the opposite direction to the friction wheels, means mounting the toothed wheels for up and down movement relative to the strip, a spring acting on the mounting means to pull the same down, and an electrical device connected to said mounting means and acting when energized to pull the mounting means upwardly.

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