Aug. 31, 1954

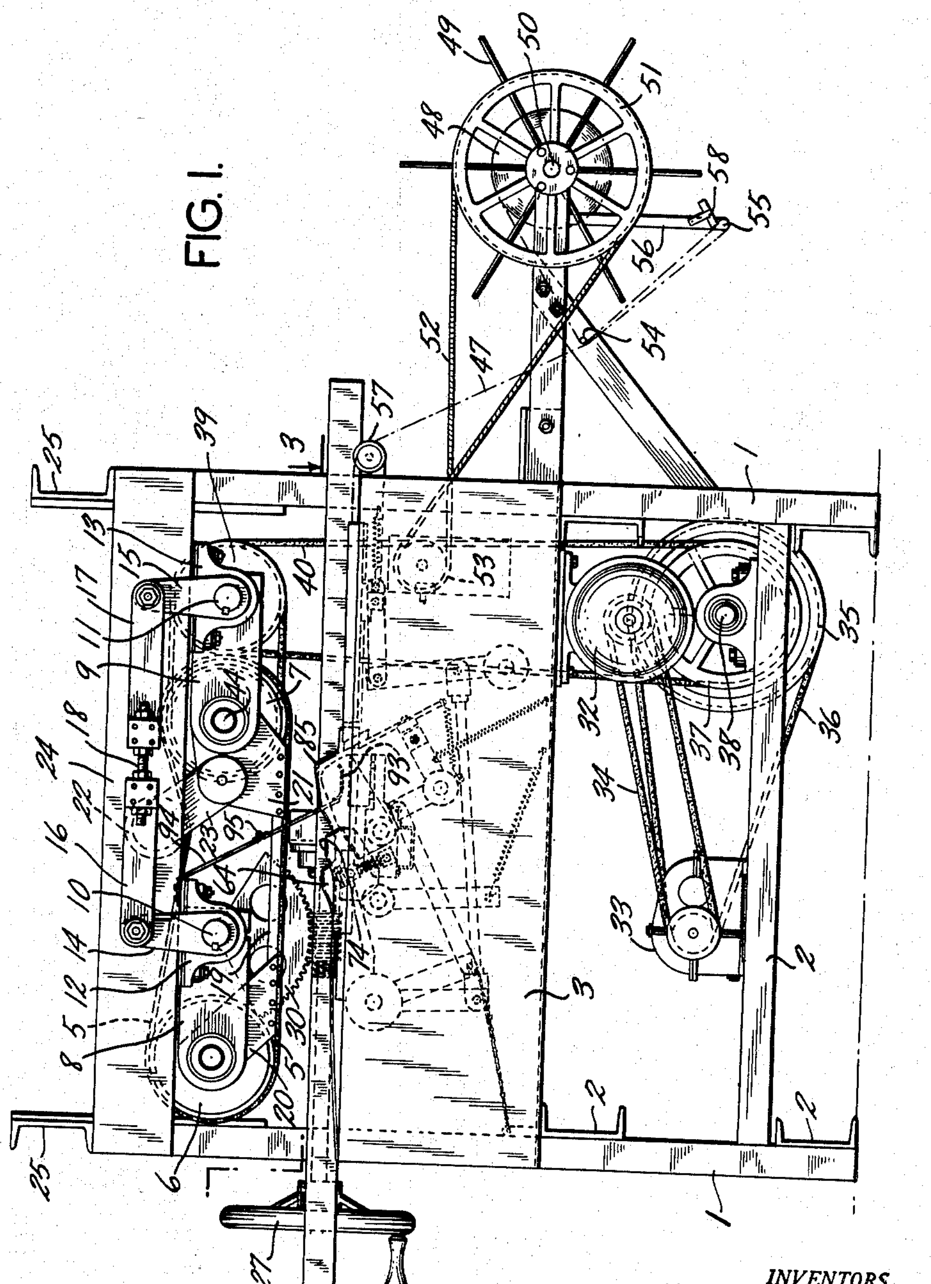
H. E. ROTHMANN ET AL
MACHINE FOR APPLYING ADHESIVE
LABELS TO CYLINDRICAL OBJECTS

2,687,820

Filed March 18, 1952

7 Sheets-Sheet 1

FIG. 1.



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7 Sheets-Sheet 2

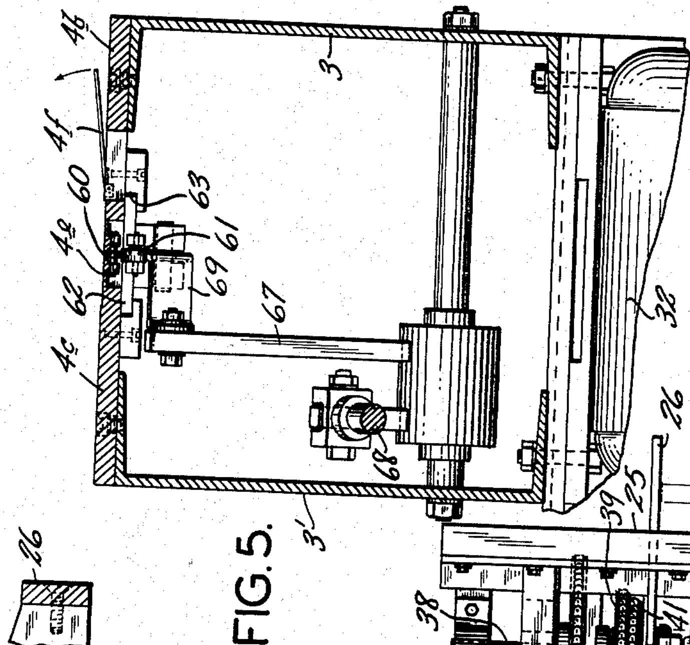

FIG.5.

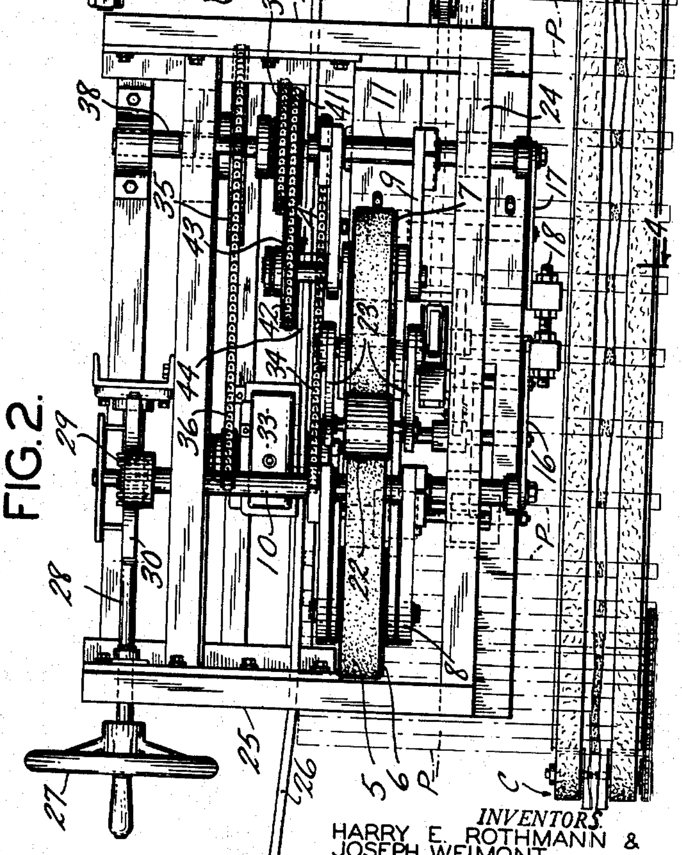

FIG.2.

FIG.9.

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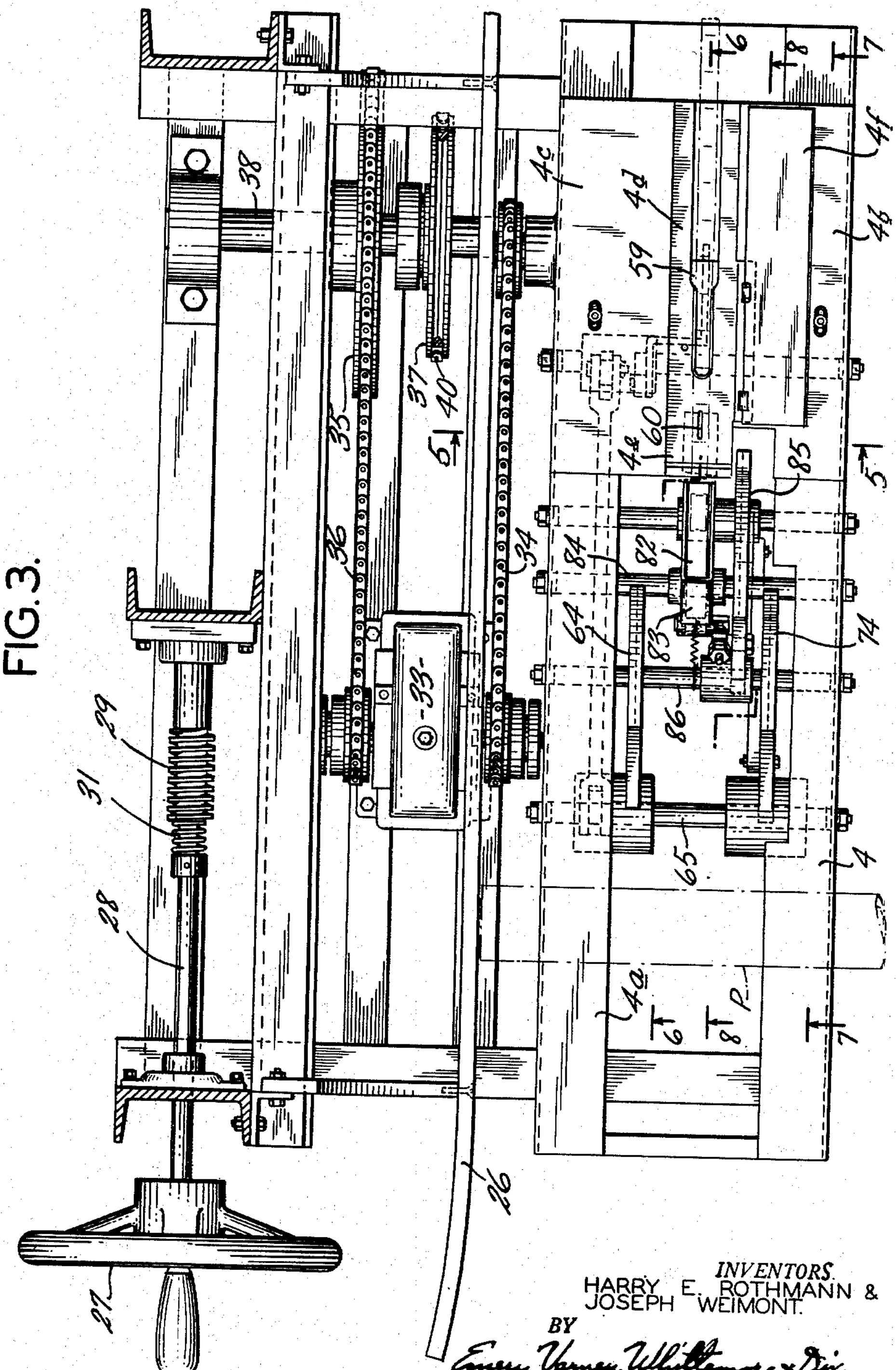
FIG. 3.



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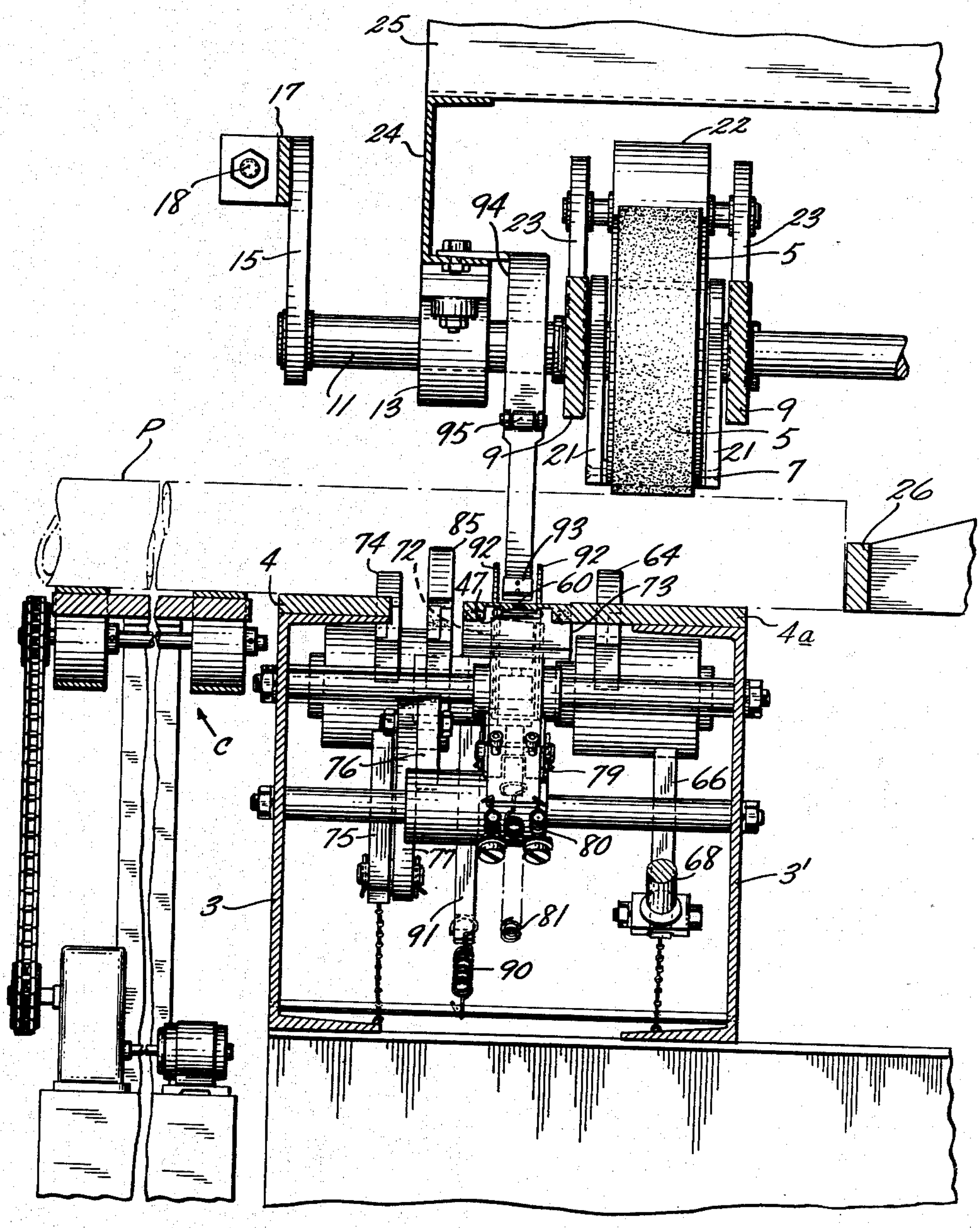

FIG. 4.

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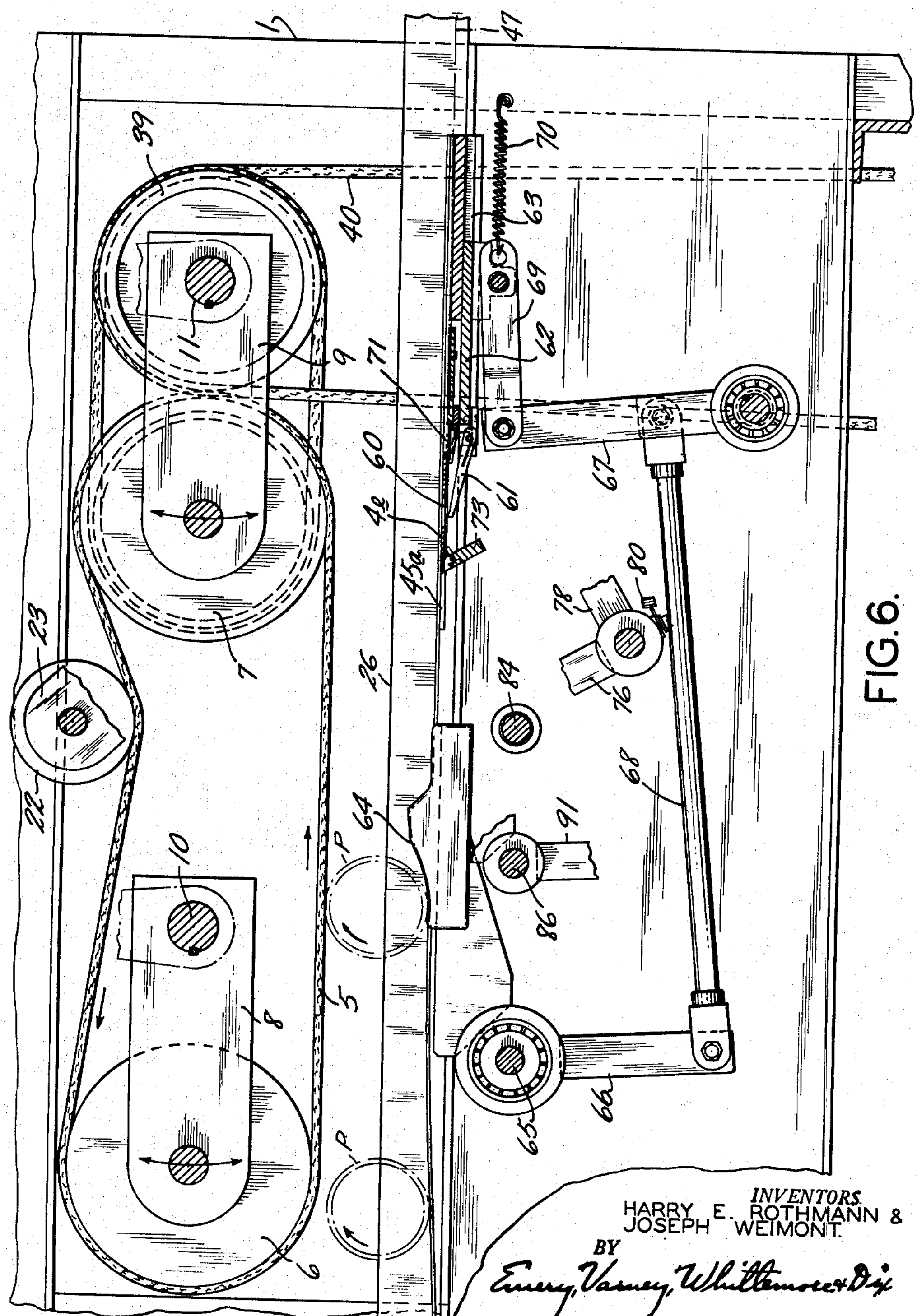

FIG. 6.

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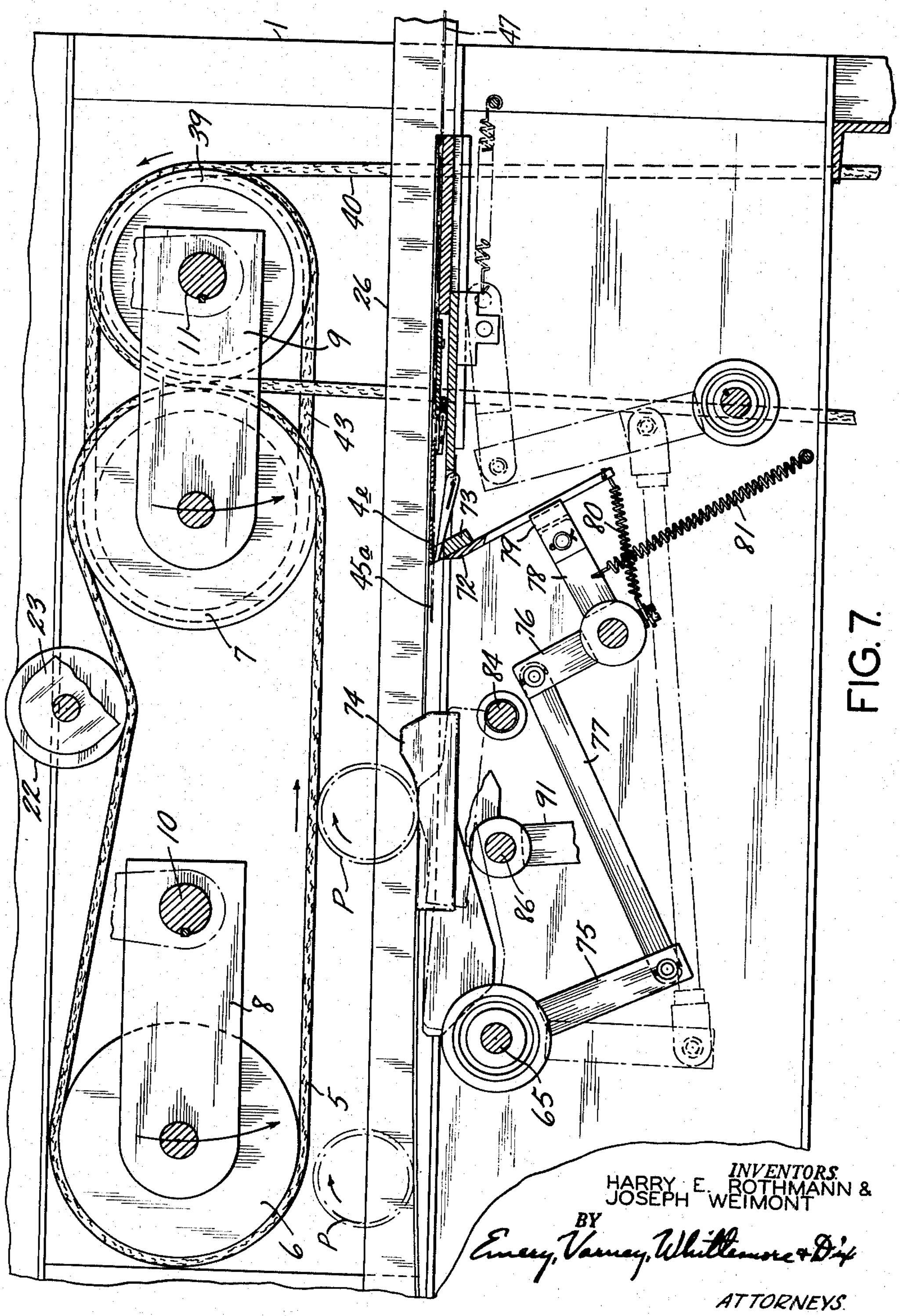

FIG. 7.

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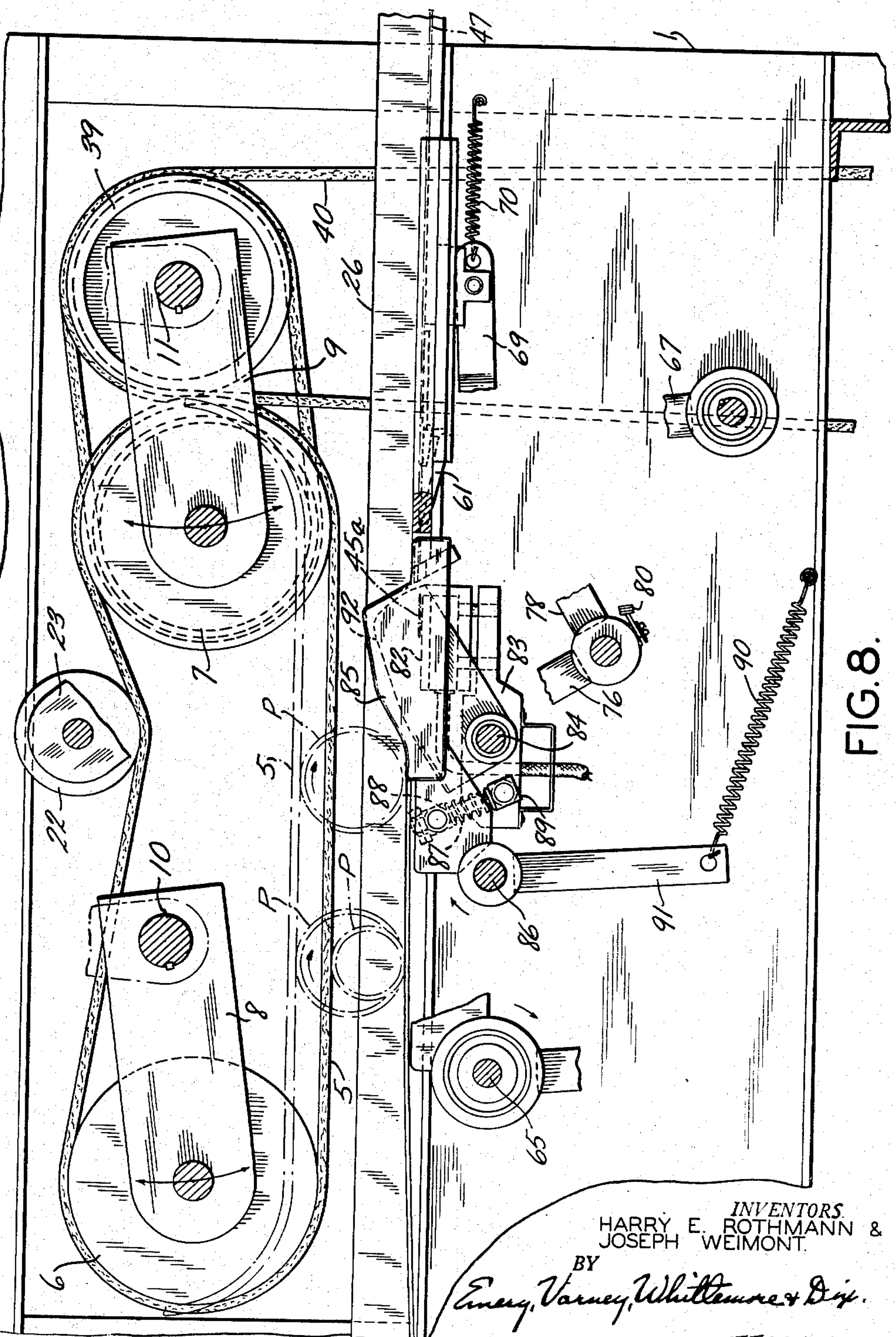

FIG. 8.

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UNITED STATES PATENT OFFICE

2,687,820

MACHINE FOR APPLYING ADHESIVE LABELS TO CYLINDRICAL OBJECTS

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Application March 18, 1952, Serial No. 277,105

13 Claims. (Cl. 216—22)

This invention relates to machines for applying adhesive labels to cylindrical objects such as pipe or tubing for example.

It is an object of the invention to provide a machine in which the cylindrical objects to be labeled are fed automatically through the machine, and in which said objects, during their progress through the machine, actuate the mechanisms which control the feeding and preparation of the labels and the application of the labels to the objects.

It is a further object of the invention to provide a machine in which the objects are automatically spaced, as they are fed through the machine, at spaced intervals such that the labeling operations, as actuated and controlled by any given object to apply a label to that object, cannot be interfered with by any succeeding object.

It is a further object of the invention to provide a machine which may be easily and quickly adjusted to receive and label cylindrical objects of different diameters, and which, when adjusted for objects of a particular diameter, will, nevertheless, receive and label cylindrical objects which vary within reasonable limits from the diameter for which the machine is adjusted.

It is a further object of the invention to provide a machine which may be relied on in every day commercial operation to apply a label to each and every object which passes through the machine, and to apply said labels neatly and securely.

Other objects and advantages of the invention will appear hereinafter.

A preferred embodiment of the invention selected for purposes of illustration is shown in the accompanying drawings, in which:

Figure 1 is a front elevation of the machine.

Figure 2 is a top plan view.

Figure 3 is an enlarged section on the line 3—3 of Figure 1.

Figure 4 is a section on the line 4—4 of Figure 2.

Figure 5 is a section on the line 5—5 of Figure 3.

Figure 6 is a section illustrating the mechanism for feeding the label strip.

Figure 7 is a similar section illustrating the mechanism for severing individual labels from the strip.

Figure 8 is a similar section illustrating the mechanism for receiving the severed labels and for elevating them to label applying position.

Figure 9 is a plan view of a label strip.

Referring to the drawings, the working parts of the machine may be supported on a suitable frame comprising vertical members 1 which may rest on a floor, which said vertical members may

be tied together by any suitable number of horizontal members 2 to form a rigid structure. A group of mechanisms which are actuated by the moving cylindrical objects are housed between a pair of channel members 3, 3' which extend lengthwise of the machine and support a plurality of horizontally disposed members 4, 4a, 4b and 4c which together constitute a table along which the cylindrical object P (indicated in broken lines) rolls as the label is being applied.

A succession of objects P which are to be labelled are advanced slowly along the table by a conveyor C. As said objects approach the belt 5 carried on the rollers 6, 7, the end object is engaged by the belt 5. The belt 5 moves at a much higher speed than the conveyor C and immediately separates the end object from those following. By properly adjusting the relative speeds of the belts, successive objects may be spaced so that each object completes its operating cycle through the machine before the next object begins its cycle. In the case of objects such as tubing having a diameter of ½'', for example, if the belt 5 is moved at approximately forty times the speed of the conveyor C, each successive tube will complete its cycle before the next tube is engaged by the belt 5.

It is desirable that the rollers be adjustable simultaneously and in unison with respect to the table so that the lower stretch of the belt which engages the objects P may remain substantially parallel to the table in any position of adjustment. For this purpose, the rollers 6, 7 are mounted on arms 8, 9, respectively, which are connected to shafts 10, 11, respectively, which are pivoted in bearings 12, 13, respectively. Shafts 10, 11 also have arms 14, 15, respectively, connected thereto, and these arms are connected by links 16, 17 having an adjustable connection 18 therebetween by means of which the lower stretch of the belt may be adjusted to lie parallel to the table.

The lower stretch of the belt is backed and supported to press firmly against the object P by a horizontal plate 19 which is carried by vertical side plates 20, 21 which are carried on shafts 10 and 11, respectively. The belt is suitably tensioned by a roller 22 mounted on arms 23 pivoted on plates 21. The entire roller and belt assembly is supported on a framework formed of channels 24, 25 which overhang the table (Figure 4) providing a space therebetween through which the objects P may travel while being labelled. An edge guide 26 is provided to guide the ends of the objects P.

Adjustment of the level of the belt to accommodate objects of different diameter is effected by a handwheel 27 on the end of shaft 28 which carries a worm gear 29 which meshes with a toothed segment 30 secured to shaft 10. Motion imparted to the segment 30 by rotation of the handwheel 27 will, through arms 14, 15 and links 16, 17 impart identical motions to the arms 8, 9 and to rollers 6, 7.

The previously described adjustment allows the machine to be adjusted to accommodate objects of different diameters, but it is also desirable that an automatic adjustment be provided to accommodate objects which vary slightly from standard diameter, or more particularly in the case of pipe or tubes, objects which are slightly bent. For this purpose a yielding connection consisting of a coil spring link 31 is placed in the shaft 28 between the handwheel and the worm gear, thus permitting the rollers and belt to lift under such circumstances.

The belt 5 is driven by a motor 32 as follows. Motor 32 drives a gear reduction unit 33 through chain 34, which in turn drives sprocket 35 through chain 36. Sprocket 35 and sprocket 37 rotate in unison on shaft 38. Sprocket 37 drives sprocket 39 through chain 40. Sprocket 39 and sprocket 41 are connected but turn loosely on shaft 11. Sprocket 41 drives sprocket 42 through chain 43. Sprocket 42 is fast to shaft 44 on which roller 7 is mounted.

The labels, as shown in Figure 9, are supplied in strip form, with individual labels 45 separated by feed apertures 46. The label strip 47 (Figures 1 and 2) is unwound from a roll 48 which is carried on a reel 49 mounted on the shaft 50 with a pulley 51. Pulley 51 is connected by a belt 52 to a smaller pulley 53 which is motor driven. The strip 47 is led from the roll 48 over a roller 54, then over a second roller 55 carried on a depending pivoted arm 56, and then over a roller 57 to the feed pawl hereinafter described.

As the feed pawl advances the strip, it shortens the loop which extends around the roller 55, pulling the arm 56 forwardly and upwardly. This arm carries a mercury switch 58 which, when tilted by movement of the arm 56 completes a circuit to the motor which drives the pulley 53. This drives the reel 49 until the loop lengthens sufficiently to restore the arm 56 to vertical position, at which time the switch opens the circuit.

After passing over the roller 57 the label strip is led along the upper surface of a shallow groove $4d$ in the table member $4c$ until it reaches the slot 59, where it is led under a thin portion $4e$ of the table. This portion of the table has a slot 60 therein into which the free end of the feed pawl 61 extends to engage the feed apertures of the label strip. After the label strip has been properly located, the hinged plate $4f$ (Figure 5) is swung over to cover the groove $4d$ and to protect the label strip during the operation of the machine.

Referring now to Figure 6, the feed pawl is pivotally mounted on a slide 62 carried in guides 63 below the table. The slide and feed pawl are actuated by the object P as it progresses along the table, as follows. The forward motion of the object depresses the cam 64 which projects above the table level and lies in the path of the object P. Cam 64 is fixed to a bearing on rod 65 and depression of the cam rocks the lever 66, also fixed to the bearing, in clockwise direction. Lever 66 is connected to lever 67 by link 68. The resulting motion of lever 67 is transmitted to the slide by link 69. After each feed movement, the slide is retracted by spring 70. Backward movement of the label strip is prevented by a pawl 71 which is pivoted to the table.

Referring now to Figure 7, when the object P has advanced to the position illustrated, the feed pawl has reached the end of its feed stroke and is about to be retracted. It is now necessary to cut off the end label $45a$. For this purpose a reciprocating knife 72 is provided which shears against the edge of the thin portion 60 of the table, being guided by a bar 73. The knife is actuated by the object P as it progresses, as follows. The forward motion of the object depresses the cam 74 which also projects above the table level and lies in the path of the object P. Cam 74 is fixed to a bearing on rod 65, and depression of the cam rocks the lever 75 in clockwise direction. Lever 75 is connected to one arm 76 of a bell crank by link 77, the other arm 78 being connected to the knife by pivoted link 79. The knife is held in yielding engagement with the bar 73 by spring 80, and is retracted after each cutting stroke by spring 81.

Referring now to Figure 8, the end label $45a$ which is cut off is received and supported on a heated plate or griddle 82 which is aligned with the label strip and is located just beyond the knife. Because of the superior adhesion obtained, the use of heat sensitive adhesive labels is preferred, and the plate 82 is heated by a suitable heating element to a temperature sufficient to sensitize the adhesive of the end label during the relatively short time it is supported thereby. The plate and its heating element are carried on a block 83 which is pivoted on rod 84. After the end label has been severed and received on the plate 82, the plate is swung upwardly into the path of the advancing object and is held in yielding contact with the rolling object so that the label is pressed firmly against the latter as it advances. For this purpose, the cam 85 is provided which projects above the table level and lies in the path of the object P. This cam is pivotally mounted on rod 86 and is yieldingly connected to block 83 by a spring 87 held between pivoted members 88 and 89. Thus, when the cam 85 is rocked in clockwise direction by the advancing object, the spring 87 is compressed to cause the block 83 and the plate 82 to rock in counter-clockwise direction to place the plate 82 and the severed label in the path of the advancing object. After the object has passed the cam 85, it is restored to its original position by spring 90 attached to arm 91.

A pair of spring pressed guide plates 92 are pivotally mounted on the rod 84, said plates lying closely adjacent the plate 82 on either side thereof and serving to prevent displacement of the severed label. The guide plates swing downwardly out of the way when they are engaged by the advancing object. The label may be further protected by a shoe 93 suspended from above by an arm 94, said shoe lying between the plates 92 and closely adjacent the plate 82. The arm 94 is provided with a spring hinge 95 to allow the shoe to swing upwardly as the object passes the attaching station. The shoe also helps to smooth the attached label.

Attention is directed to the fact that the knife 72 is inclined to the plane of table and moves in a path which is inclined thereto. With this arrangement the knife, as it severs the end label from the strip, pushes the severed label ahead so that the entire area of the severed label is above the heated plate.

In the operation of the machine a cylindrical object P such as a length of pipe is rolled onto the table, either by hand or by a conveyor. As it approaches the belt **5**, it is engaged by the belt and rolled along to engage and actuate, successively, the cams **64**, **74** and **85**. Actuation of cam **64** feeds the label strip one label length, causing the end label to advance to a position above the label holder. Actuation of the cam **74** severs the end label and advances it with respect to the label holder so that the entire area of the label is exposed to the heat of the plate **82**. Actuation of cam **85** swings the label holder upwardly so that the label is in the path of the advancing object. As the object rolls against the label holder, the label adheres to the object, the label holder being held in yielding engagement with the object and pressing against the object to improve the adhesion.

It will be understood that the invention may be variously modified and embodied within the scope of the subjoined claims.

We claim as our invention:

1. In a machine for applying adhesive labels to cylindrical objects, in combination, a table along which a cylindrical object may be rolled, a label holder mounted for movement relative to said table means including a cam lying in the path of said object and actuated thereby for feeding a label to said label holder, and means including a cam lying in the path of the same object and subsequently actuated thereby for moving said label holder into the path of said object with said label in position to be engaged by said object.

2. A machine as claimed in claim 1 in which said cylindrical object is rolled along said table by an endless belt having a straight stretch lying substantially parallel to the table.

3. A machine as claimed in claim 1 in which said cylindrical object is rolled along said table by an endless belt having a straight stretch lying substantially parallel to the table, and in which means are provided for adjusting the level of the straight stretch with respect to the table to accommodate objects of different diameter while retaining the parallel relationship to the table.

4. A machine as claimed in claim 1 in which said cylindrical object is rolled along said table by an endless belt having a straight stretch lying substantially parallel to the table, and in which said belt is yieldingly supported to permit it to move relative to said table to accommodate objects of different diameter.

5. A machine as claimed in claim 1 in which a yielding element is interposed between said label holder and its actuating cam.

6. A machine as claimed in claim 1 in which said cylindrical object is rolled along said table by an endless belt having a straight stretch lying substantially parallel to the table and in which a yielding element is interposed between said label holder and its actuating cam.

7. Apparatus as claimed in claim 1 in which said labels are supplied from a label strip, and having means including a cam lying in the path of said object and actuated thereby to sever the end label from the label strip, said last named cam being located ahead of said label holder cam and being actuated by said object to sever said end label from the strip before said label holder is moved into the path of the object.

8. Apparatus as claimed in claim 1 in which said labels are supplied from a label strip, and having means including a knife to sever the end label from the strip, said knife being mounted to advance said severed label relative to said label holder.

9. Apparatus as claimed in claim 1 in which said labels are supplied from a label strip, and means including a knife to sever the end label from the strip, said knife being mounted to reciprocate in a plane which is inclined to the plane of the table.

10. A machine as claimed in claim 1 in which said cylindrical object is rolled along said table by an endless belt having a straight stretch lying substantially parallel to the table, and in which a yielding element is interposed between said label holder and its actuating cam, and in which said labels are supplied from a label strip, and having means including a cam lying in the path of said object and actuated thereby to sever the end label from the label strip.

11. A machine as claimed in claim 1 in which said cylindrical object is rolled along said table by an endless belt having a straight stretch lying substantially parallel to the table, and in which said objects are advanced toward said belt by a conveyor moving at a speed substantially lower than the speed of said belt.

12. A machine as claimed in claim 1 in which said cylindrical object is rolled along said table by an endless belt having a straight stretch lying substantially parallel to the table, and in which said objects are advanced toward said belt by a conveyor moving at a speed sufficiently lower than the speed of said belt to cause each object to complete its operating cycle before the next succeeding object is moved to position for engagement by said belt.

13. A machine as claimed in claim 1 in which said cylindrical object is rolled along said table by an endless belt having a straight stretch lying substantially parallel to the table, and in which said objects are advanced toward said belt by a conveyor moving at a speed sufficiently lower than the speed of said belt to cause successive objects to be spaced at a predetermined distance sufficient to prevent interference with an operating cycle by a succeeding object.

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