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BUNDLE FEEDER

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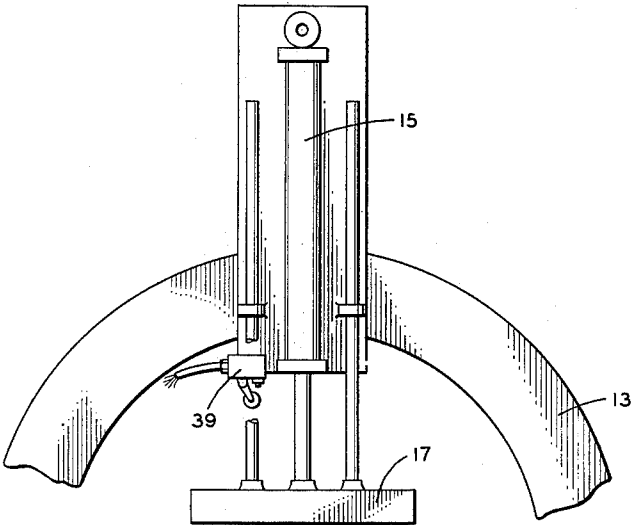


FIG. 4.

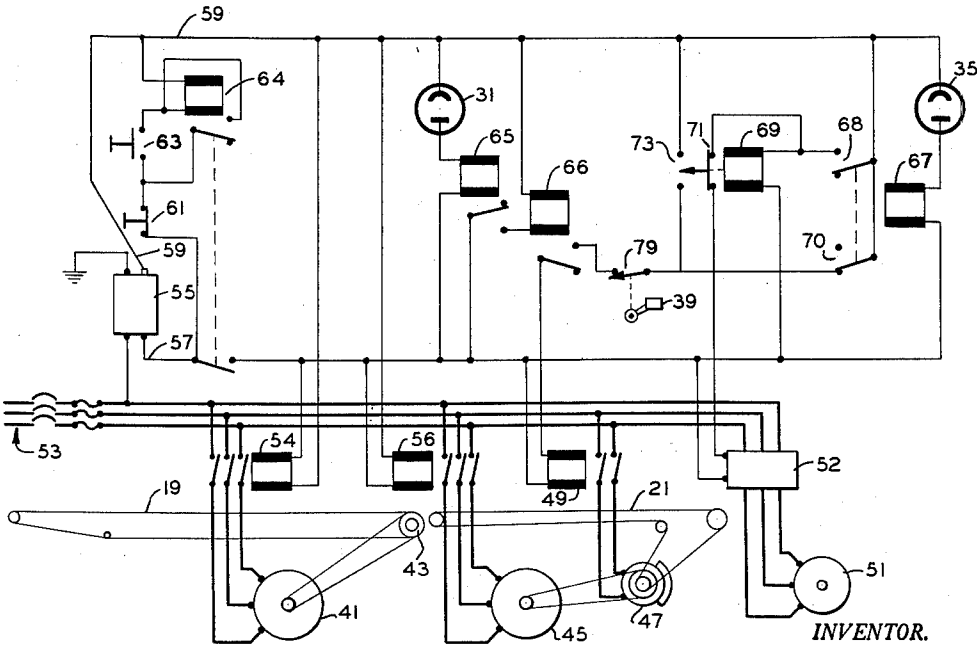


FIG. 3.

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3,077,157 BUNDLE FEEDER

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This invention relates to a feeding machine for a tying machine. More particularly, the invention relates to a conveyor and feeding system for automatically feeding bundles of newspapers into a wire tying machine for tying the papers into bundles.

Although satisfactory tying machines are well known in the art, methods of feeding such machines have heretofore not been satisfactory, particularly when one wishes to tie a bundle of loose articles such as a stack of newspapers. Loose articles such as newspapers have little rigidity and the methods for feeding and tying boxes and bales are not satisfactory when applied to newspapers. Although machines have been proposed for feeding newspapers into a tying machine, such machines have worked on the principles of employing a pusher arm or ram which has not worked out in practice so that it is customary to push manually bundles of newspapers into a wire tying machine.

In accordance with the present invention, a fully automatic feeding device is provided which eliminates the hand labor and attendant danger inherent in feeding stacks of newspapers into a tying machine by hand. Further, the present invention provides a machine which has relatively few moving parts so that it is inexpensive to construct and is trouble-free in service. Other features of the invention will be apparent from the specification.

In the drawings forming part of this application:

FIGURE 1 is a perspective view of a tying machine and the feeding device of the present invention.

FIGURE 2 is a partial view of a conveyor belt used in conjunction with the present invention.

FIGURE 3 is a schematic diagram of the control circuitry used in conjunction with the present invention.

FIGURE 4 is a partial front view of the wire tying machine showing the position of the microswitch which is used as the overriding control thereon.

Turning now to a description of the drawings by reference characters, there is shown a tying machine generally designated 5 having in association therewith the conveying and feeding mechanism of the present invention generally designated 7. The tying machine 5 has a feeding table 9 thereon to which is attached a short table 11. The table 11 supports a stack of papers while they are actually being tied while the table 9 supports a stack of papers just before they are to be tied. In other words, the capacity of the machine is two bundles of paper, one of which is actually being tied while the other is in a position to be advanced to tying position. The tying machine also incorporates a tying ring 13 and a pneumatically actuated ram 15 having a head 17 thereon which serves to compress and hold stacks of papers while they are being tied. The tying machine forms no part of the present invention and therefore it will not be further described.

The feeder for the tying machine comprises two endless belts, namely a first endless belt 19 and a second endless belt 21. On each side of the belt 19 are tables 23 and 25 on which operators can count and stack papers and push them onto the belt 19 for conveying and eventual tying. The belt 19 has a smooth, slippery surface and may be made of flexible steel. On the other hand, the belt 21, as is shown in detail in FIGURE 2, is made of rubber having a base 27 and has a myriad of rubber fingers 29 extending upwardly therefrom. Thus the belt 21 has a tremendous gripping and pushing power. On

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the other hand, since the belt 19 has a smooth surface, a stack of papers will be conveyed along the belt if not impeded, but it is easy to hold a stack so that the belt merely slides thereunder. The belt 19 runs continuously while the belt 21 operates intermittently and is actuated by the stack of papers as is hereinafter fully described.

Stationed at one side of the forward end of belt 21 is a photocell 31 and a light source 33. Similarly, adjacent the tying table 11 is a second photocell 35 and a light source 37. Attached to the ram mechanism of the tying machine 5 is a microswitch 39. The function of these photocells and the microswitch will be explained in connection with the circuit diagram.

The control circuitry and motors are shown in the schematic diagram of FIGURE 3. Here there is shown a motor 41 which drives the belt 19 through a suitable drive 43. The belt 21 is driven by the motor 45, but in this case is connected to the belt 21 through a clutch mechanism 47 having an electric clutch actuator 49 connected therewith. The tying machine itself is driven by a motor 51, the motor 51 being connected by means of a suitable actuator 52 so that when once energized momentarily, it will continue in operation for one complete wire tying cycle and will then shut itself off. Electricity for the various driving motors is provided by the A.C. circuit formed by the heavy wires of a three phase circuit 53 while a suitable converter 55 supplies current to the control circuit formed by the wires 57 and 59. A first switch 61 serves as an emergency switch while a second double pole, single throw switch 63 serves to break the control circuit only. This switch has a relay 64 associated therewith and need be closed only momentarily to close and maintain the control circuit. The motor starting switches 54 and 56 are connected to the wire 57 so that closing the switch 63 will start the motors 41 and 45. A first photocell 31 is connected into the control circuit as is shown and serves to actuate a normally open, single pole, single throw relay 65. The relay 65 when actuated (providing the overriding circuits hereinafter described are closed), serves to actuate relay 66 which in turn serves to engage clutch 47 through actuator 49. A second photocell 35, which is located on the tying table serves to actuate the relay 67. Relay 67 has a first set of contacts 68 which actuate a third relay 69 which is of the double pole, double throw type having two sets of contacts designated 71 and 73. Relay 67 has a second set of contacts 70 which serve to complete the circuit to the clutch actuator 49 when the relay 67 is energized. Normally, the relay 69 has its contacts 71 closed and the contacts 73 opened. When the contacts 71 are closed, they serve to form a continuation of the circuit leading to the tying machine actuator 52. When the contacts 73 are closed, they provide an alternate path to complete the circuit to clutch actuator 49, and are necessary, as will later appear, to allow the belt 21 to be advanced upon the completion of a tying operation while the tied bundle is still breaking the light beam to photocell 35.

The limit switch 39, which is located on the ram of the tying machine has contacts 79 which are normally closed and which, in the closed position, serve to complete the circuit to the electric clutch actuator 49. The switch is opened when pressure is exerted on the ram, and its function is to prevent the operation of the belt 21, with consequent jamming of the machine, while a tying operation is being conducted and the circuit to actuator 49 otherwise closed.

Turning now to a description of the operation of the device, stacks of newspapers are placed on the belt 19, with the longer axes of the stacks parallel to the path of travel. Since the belt 19 is moving at all times the device is in operation, the newspaper stack is propelled

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to the proximity of the belt 21 which is, of course, stationary. As the beam of light from the source 33 to the cell 31 is intercepted, the relay 65 opens closing relay 66, causing the electric actuator 49 to engage the clutch 47 starting the belt 21 and carrying the stack of newspapers the length of one stack, i.e. until the light beam is re-established, whereupon the clutch will disengage and the belt 21 stop. This is on the assumption that only a single pile of papers has been placed on the belt 19 or at least that no stack has been placed adjacent the stack under discussion. If a stack immediately follows the stack under discussion, the light beam will not re-establish itself and the clutch will stay engaged until the second stack has cleared the photocell and so on. Since the belt 21 is of a length to hold three stacks of papers, the belt will fill up one stack at a time since the stack will not pass much beyond the light beam unless it is immediately followed by another stack. In this manner, the belt will be fully loaded with three stacks of papers before the stacks are discharged from the belt 21.

After the belt 21 is filled, it will start discharging stacks onto the table 9. Since the table 11 will have three stacks on it before it discharges and, since the belt 21 is made with gripping fingers as has been heretofore described, there will be a solid push behind stacks entering the table 9. As soon as the second stack is discharged onto the table 9, the first stack through will reach the tying table 11 whereupon it will break the light beam from the source 37 to the cell 35, actuating the relay 67 which in turn actuates the relay 69. Just as the relay 69 is actuated, a pulse of current will pass through the contacts 71 to the tying actuator 52. Although the circuit through contacts 71 will be immediately broken, the tying motor 51 will continue through one complete tying cycle as has heretofore been explained. As the relay contacts 73 close, they provide an alternate path for current to the actuator 49, so that belt 21 can be later restarted even if a bundle of papers on the tying table is breaking the beam to cell 35.

As the ram of the tying machine comes down the contacts 79 of switch 39 open, acting as an override and preventing motion of belt 21 while a tying operation is going on. Thus, the belt 21 will be in a stop condition while the tying operation is taking place, preventing jamming of the tying machinery. It is obvious that if the belt 21 were actuated when it was full as well as the tables 9 and 11, the machine would jam since the stack of papers on the table 11 must remain stationary for a sufficient length of time for the tying operation to take place. As soon as the tying operation is complete, pressure will be released on the switch mechanism 39 again closing the contacts 79 and rendering the circuit to the brake-actuating mechanism 49 operative.

Assuming that another bundle of papers is ready to start over the belt 21, the cell 31 will be actuated, closing the circuit of the brake-actuating mechanism 49. Of course, since a bundle is on the tying table, the circuit for actuator 49 will be established through contacts 73 and not through contacts 79. This will allow another bundle to come onto the table 21; the front bundle on belt 21 will then push a bundle against the bundle waiting to be tied on the table 11. This bundle will in turn force the bundle which has been tied off of the table 11 onto the conveyor rollers 81. As the bundle tumbles off of the tying table 11, the light beam to cell 35 will be momentarily re-established, readying the machine for a repetition of the cycle. The bundle from table 9 which has forced the bundle off of table 11 will now come into position on table 11 where it will actuate the photocell 35 for a repetition of the cycle.

It is believed obvious from the foregoing that I have invented a simple and effective mechanism for feeding

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a bundle tying machine which substantially eliminates the use of hand labor in the tying operation.

I claim:

1. A feeder for a bundle tying machine comprising in combination a first endless conveyor belt having a relatively smooth surface, said first conveyor belt running continuously, a second conveyor belt forming a continuation of said first conveyor belt, said second conveyor belt having an intermittent drive mechanism means adjacent said second conveyor belt whereby the leading edge of a bundle of papers conveyed from the first conveyor belt will cause said drive mechanism to engage, said second conveyor belt being adapted to hold a plurality of bundles and having a paper gripping surface, said means disengaging said drive mechanism as soon as a bundle passes said means whereby said second conveyor belt will be completely filled by newspaper bundles before discharging bundles from the end thereof.

2. A feeder for a bundle tying machine comprising in combination a first endless conveyor belt having a relatively smooth surface, said first conveyor belt running continuously, a second conveyor belt forming a continuation of said first conveyor belt, said second conveyor belt having a drive mechanism, a photocell at a side of the leading edge of said second conveyor belt, a light source at the opposite side of said conveyor belt whereby said light beam shining on said photocell from said light source is interrupted by a bundle of papers when entering said second conveyor from said first conveyor and placed therebetween, said photocell causing said drive mechanism to be activated only when said light beam is interrupted, said second conveyor belt being adapted to hold a plurality of bundles and having a paper gripping surface, and means whereby said second conveyor belt will be completely filled by newspaper bundles before discharging bundles from the end thereof.

3. A feeder and bundle tying machine comprising in combination a first endless conveyor belt having a relatively smooth surface, said first conveyor belt running continuously, a second conveyor belt forming a continuation of said first conveyor belt, a first photocell means comprising a photocell and a light source located on opposite sides of the path of travel at the leading edge of the second conveyor belt whereby an object entering said second conveyor belt will intercept light from said light source to said photocell, said second conveyor belt having a drive mechanism actuated by said first photocell means when a light beam is intercepted by a bundle of papers conveyed from the first conveyor belt, said second conveyor belt being adapted to hold a plurality of bundles and having a paper gripping surface, means whereby said second conveyor belt will be completely filled by newspaper bundles before discharging bundles from the end thereof, second photocell means comprising a photocell and a light source, said light source casting a beam normal to the path of travel of said bundles, said second photocell means being located on a bundle tying machine adjacent the discharge end of said second conveyor belt, said second photocell means actuating the tying machine when a beam of light thereto from said second light source is interrupted.

4. The machine of claim 3 wherein the bundle tying machine is adapted to inactivate the driving means of the second conveyor belt while tying a bundle.

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