Oct. 10, 1933. G. O. FROSTAD ET AL 1,929,632

PAPER CAN MACHINE

Filed Jan. 29, 1930 5 Sheets-Sheet 1

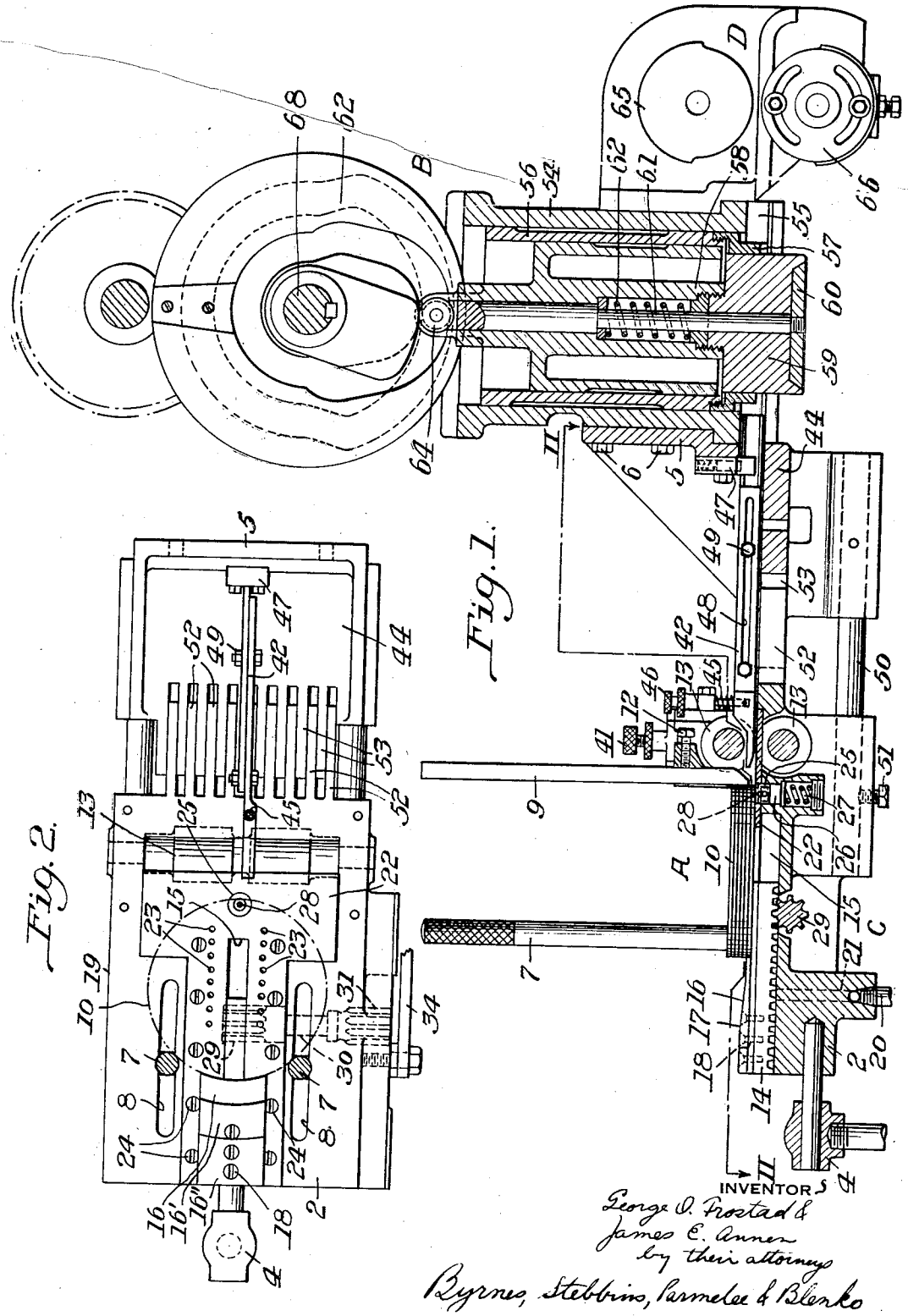


Fig. 1.

Fig. 2.

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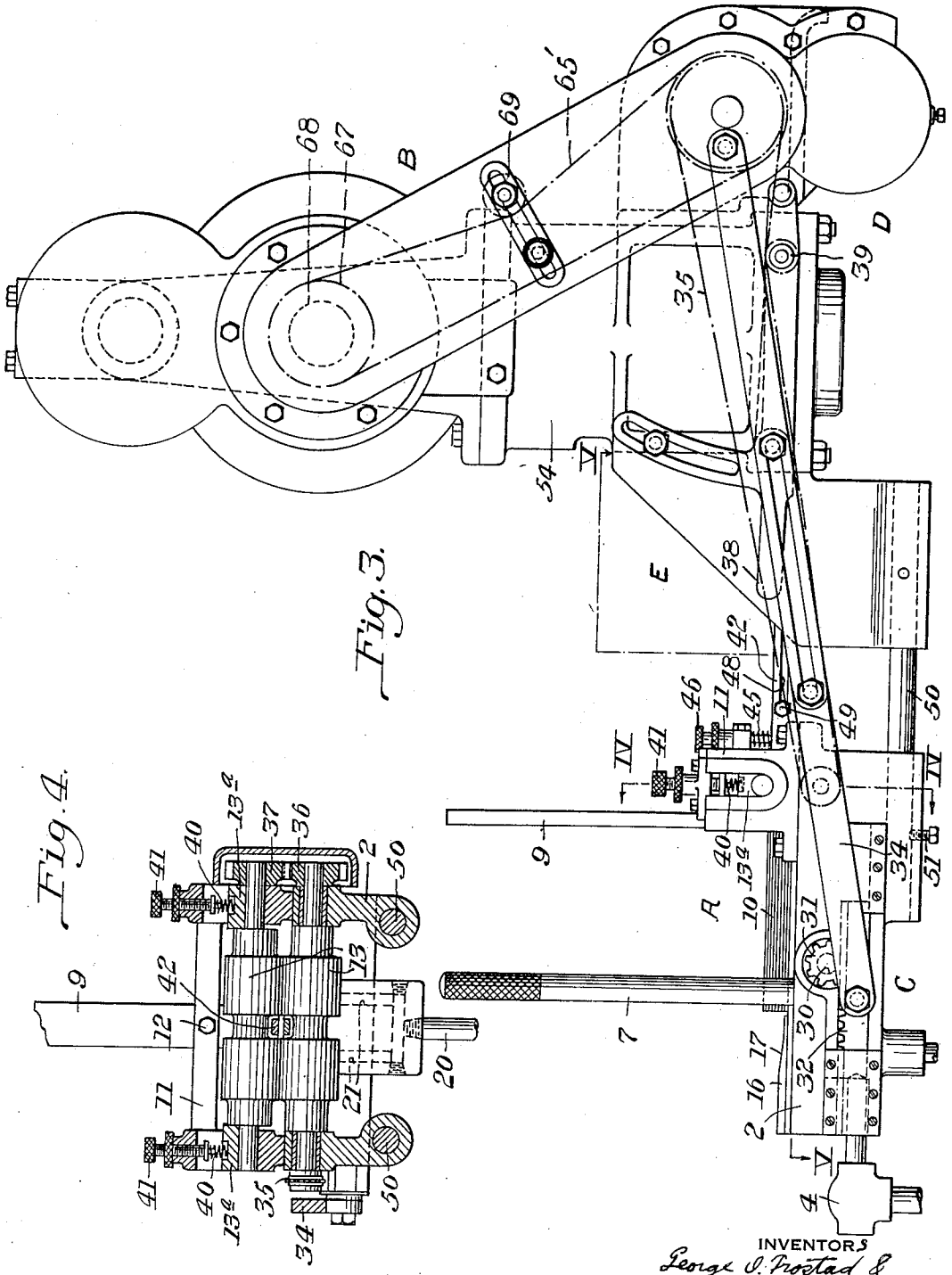


Fig. 3.

Fig. 4.

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Fig. 5.

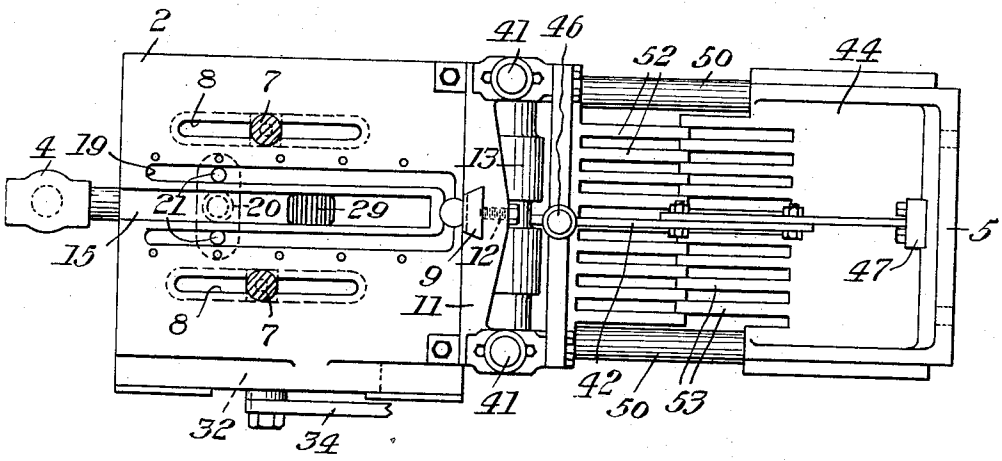
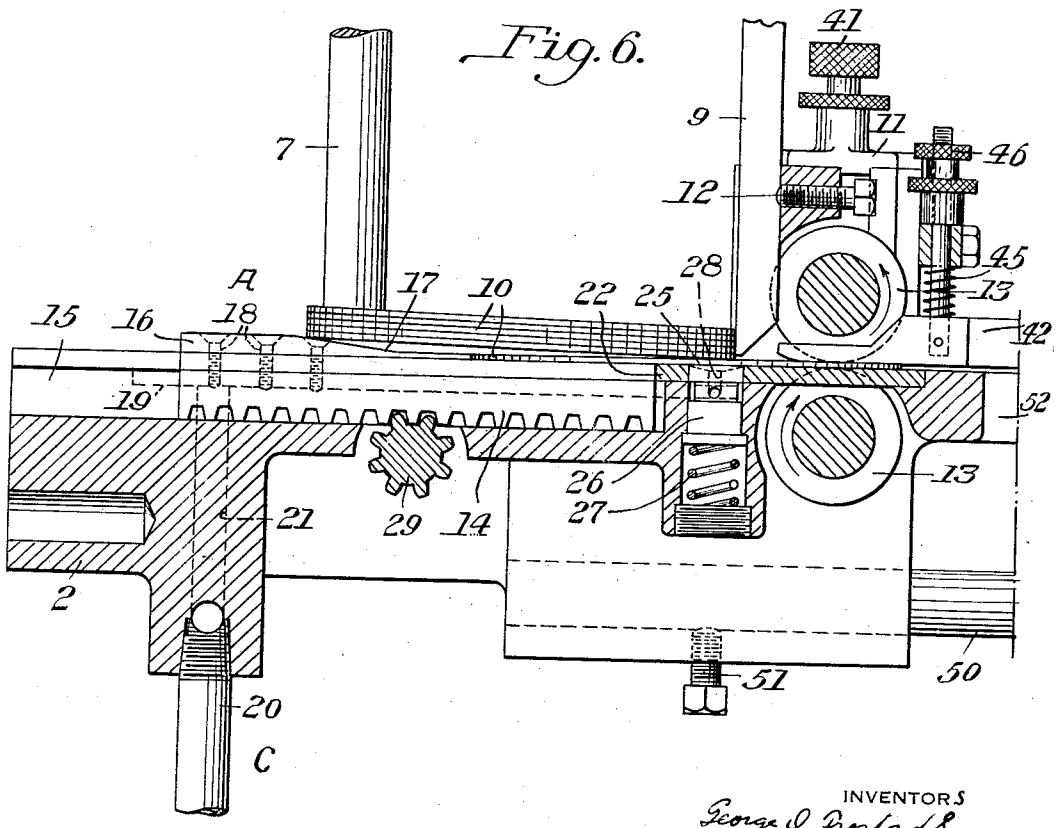


Fig. 6.



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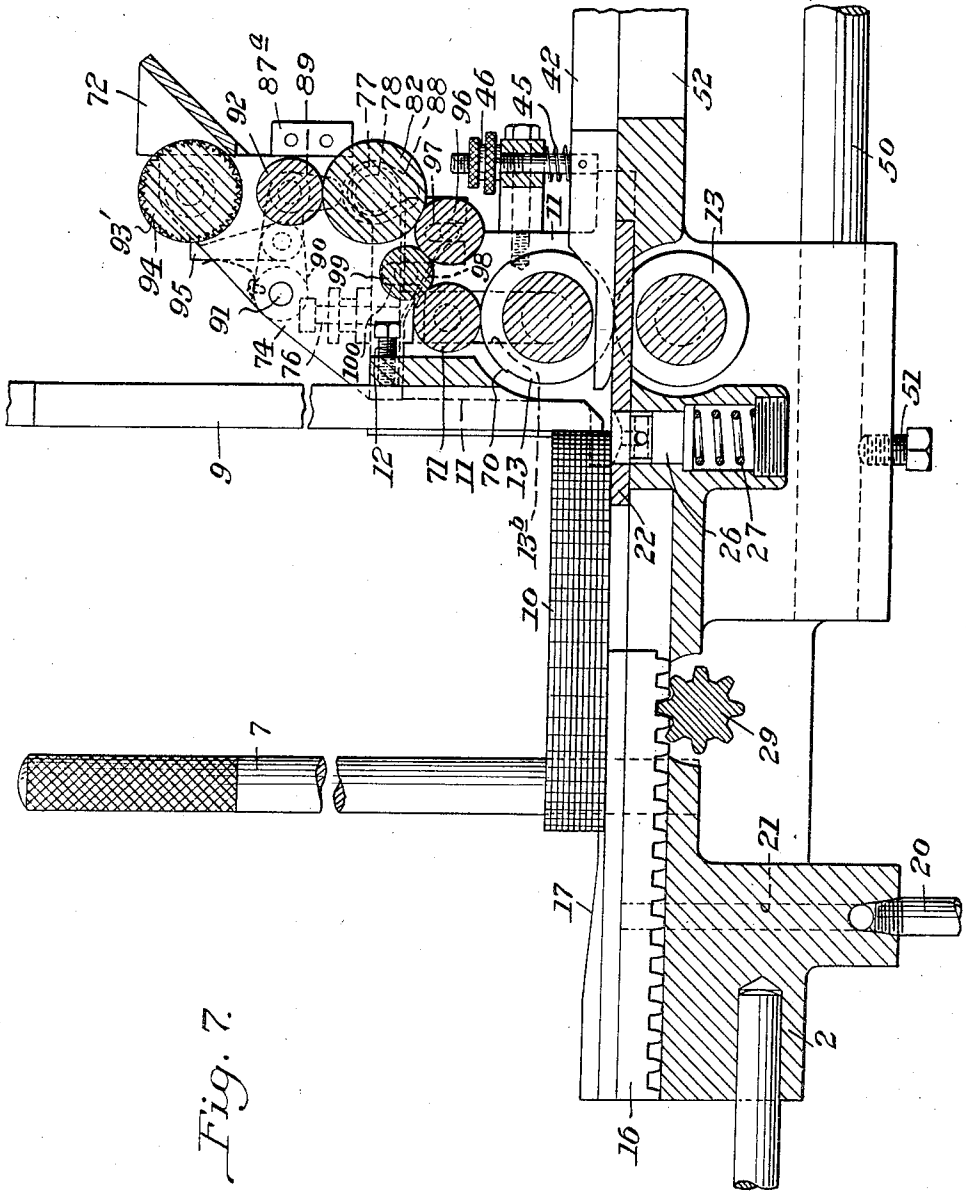


Fig. 7.

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Fig. 8.

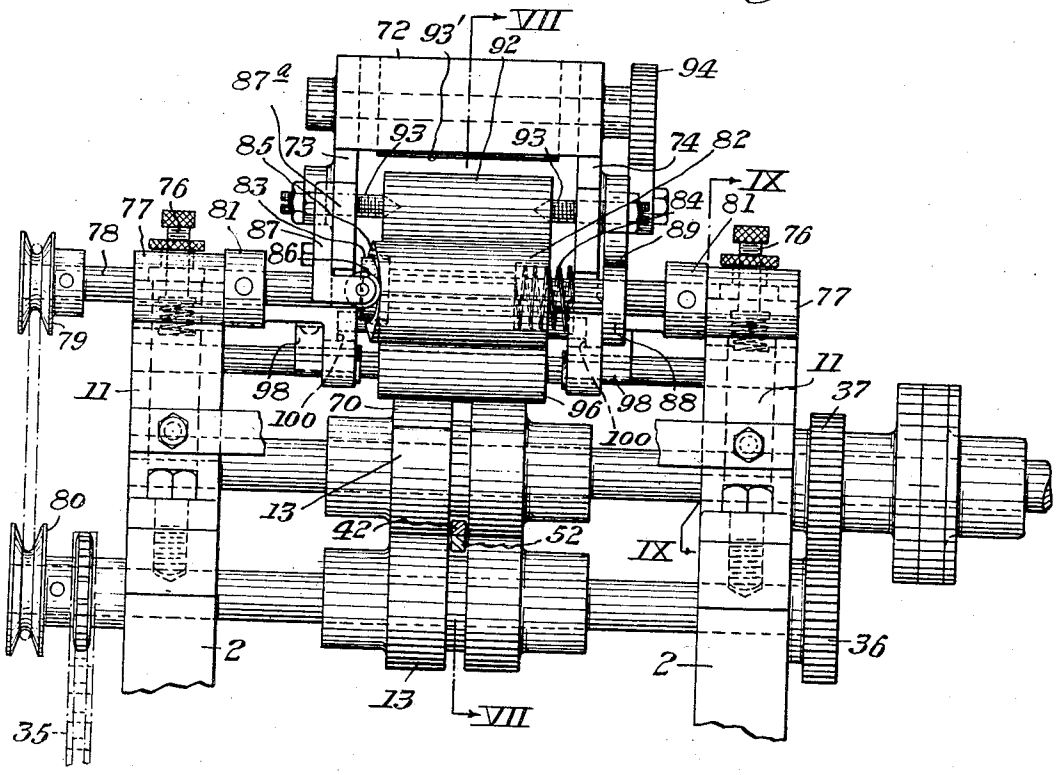
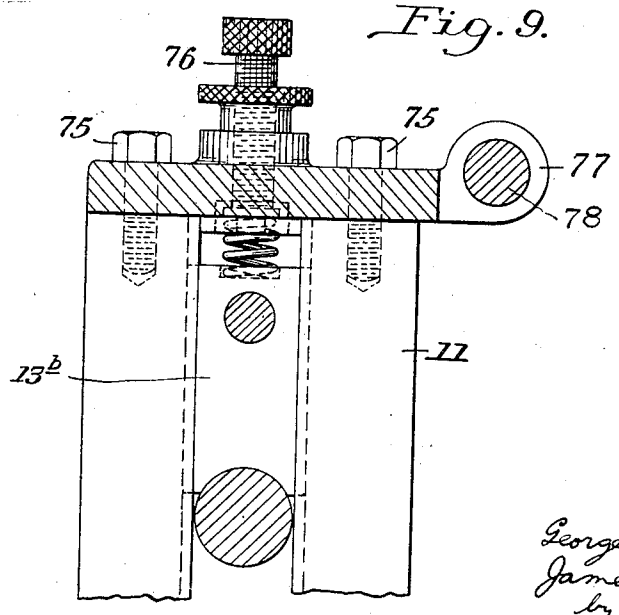


Fig. 9.



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UNITED STATES PATENT OFFICE

1,929,632

PAPER CAN MACHINE

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Application January 29, 1930. Serial No. 424,261

3 Claims. (Cl. 93—51)

This invention relates to can machines in which discs of paper or the like are applied to can bodies. The invention is herein particularly described as a paper can making machine, although its use is not limited to the making of paper cans. In our application Serial No. 267,878, filed April 6, 1928, there is described means for punching discs from a paper strip, flanging the same and forcing them into the open end of a preformed can body. The can body and the flange are thereafter rolled together to form a joint.

In certain cases, it is desired to have printed matter appear on the disc forming the can end. It is difficult to insure continuous registry of the punching die with printed matter appearing at intervals on a paper strip, and it is therefore desirable to preform and print the discs and feed them individually to the machine. In other cases, it may be desired for various reasons to feed unprinted discs to the machine.

We provide means for printing or embossing legends on the can ends as the latter are fed to the machine. These means include printing rolls and ink supply rolls adapted to ink the printing rolls intermittently.

The discs employed are relatively thick and stiff as compared with ordinary paper. They are usually of relatively heavy stock, impregnated with paraffin. Their edges are generally slightly burred, due to the die cutting operation. The discs therefore tend to resist sliding of one over the other, thus making ordinary feed devices impracticable. The discs are frequently warped or wrinkled.

We provide a can machine, wherein discs are supported in a stack and fed into cooperative relation to the open end of a can. The feeding is from the bottom of the stack so that the supply of discs may be renewed without stopping the machine. We provide suction means for drawing the bottom disc against the supporting plate, thereby eliminating the irregularities in feeding which ordinarily arise from the wrinkled condition of the material.

We preferably employ a reciprocating pusher for sliding the bottom disc out from under the stack. Means is also provided for riffling the stack so as to remove any tendency of the discs to adhere. This tendency arises from the burrs formed on the disc edges by the punching operation. We employ a separating finger spaced far enough from the support to permit passage of the bottom disc in the stack, but holding the remainder of the stack in check. Supplemental means is provided beyond the fingers for feeding the discs forward. This supplemental means preferably comprises a pair of constantly driven feed rolls.

Regardless of whether a disc feeding device is employed in connection with a can making machine or in some other combination, it is generally impossible to employ feed means which will carry the disc to its ultimate destination. We therefore provide for feeding one disc forward by engaging it with a succeeding disc. In this manner, the disc fed may be spaced from the disc consuming device, thereby making it easy to adjust. At the same time, there is no necessity for complicated mechanism for advancing the discs to their final position.

Since one disc is fed forward by another, we provide for varying the position of the disc feeding device relative to the disc consuming device. It is desirable to maintain a substantially continuous supporting surface along the entire path of the discs, and we therefore employ a pair of supporting members having interengaging fingers. These fingers may be moved into or out of engagement with one another in varying amounts, so as to provide a substantially smooth and continuous supporting table of varying length. A top guide is provided for holding the fed discs against the table so as to insure that the edges of the leading disc and the one which is pushing it forward will not overlap. This top guide preferably extends from the feed rolls to the disc consuming device and is therefore made adjustable as to length. It is further provided with yielding means whereby it exerts a slight pressure on the top of the disc.

The disc feeding device is arranged to be driven from the disc consuming device, so that the two units operate in timed relation.

While we have described the feeding mechanism in connection with paper discs, it is to be understood that it is applicable for use in connection with other material and with machines other than can forming machines, and that such uses are contemplated without departing from the scope of the invention.

In the accompanying drawings which illustrate the present preferred embodiment of our invention,

Figure 1 is a sectional view of a feeding machine embodying our invention;

Figure 2 is a plan view thereof taken along the section line II—II of Figure 1;

Figure 3 is a side elevation of the machine shown in Figure 1;

Figure 4 is a view partially in elevation and partially in section, taken along the section line IV—IV of Figure 3;

Figure 5 is a plan view taken along the section line V—V of Figure 3;

Figure 6 is an enlarged sectional view of a portion of the feeder mechanism shown in Figure 1;

Figure 7 is a view similar to Figure 6 showing a modification provided with an inking fountain and inking rolls;

Figure 8 is a partial elevation of the structure

of Figure 7 looking upon the right-hand end of the latter; and

Figure 9 is a section taken at the plane of line IX—IX of Figure 8.

We provide a can machine in which a feeding mechanism A for feeding paper discs to a cam driven plunger B for shaping and inserting them into cylindrical can bodies, and a vacuum system C for controlling the movement of the discs. Feeder rollers D may supply a strip of paper to the plunger B from which discs are punched. The movement of the feeding mechanism A, plunger B and the rollers D are coordinated by an interconnecting mechanism E.

The feeding mechanism A for feeding paper discs to the plunger B comprises a base 2, supported in part by a standard 4, and in part by a plate 5, secured by bolts 6 to the plunger mechanism B. Standards 7 are adjustably mounted in slots 8 in the base 2 and cooperate with a standard 9 for supporting a stack of paper discs 10. The standard 9 is adjustably supported on a frame 11, carried by the base 2 by a set screw 12. The lower end of the standard 9 is spaced from the base 2 a sufficient distance to permit but a single disc 10 to pass therebeneath at any time into engagement with feed rollers 13, mounted in the frame 11. As shown in Figures 3 and 4, the upper roller 13 is resiliently maintained in engagement with the lower roller by a spring-pressed bearing block 13*a* slidably mounted in the frame 11.

A rack 14 is mounted in a slot 15, centrally disposed at the center of the base 2. The rack 14 carries a plate 16, that engages the outer edge of the lower disc 10 during the feeding operation. As is shown in Figure 2, the rack 14 may be provided with a plurality of plates 16′ and 16″, depending upon the diameter of the discs 10. The plate 16 having a sloping portion 17 is secured to the rack 14 by screws 18.

Referring to Figure 6, the plate 16 engages the rear edge of the lower disc 10 and advances it during the operation of the feeding mechanism A, at which time the plate 16 slides beneath the stack of discs 10 and riffles them, thereby freeing the lower disc 10 from the stack preparatory to a subsequent feeding operation.

The base 2 is provided with a chamber 19 that surrounds the slot 15, to which a pipe 20, constituting a portion of the vacuum system C, is attached by branch pipes 21. The chamber 19 is covered by a plate 22, that is held in position by screws 24. The plate 22 is provided with a plurality of openings constituting ports disposed above the chamber 19. The ports 23 permit a gripping action of the discs 10, as they move along the base 2, thereby flattening them and holding them tightly in position to be engaged by the rollers 13.

At one end of the chamber 19, there is disposed a suction gripper 25, constituted by a block 26, that is upwardly biased by a spring 27, in order that the outer face of the block 26, which is provided with a port 28, shall engage the advancing disc and draw it firmly against the plate 22, in order that a positive engagement may be made between it and the rollers 13. As the edges of the discs 10 may carry burrs, it is important that provision be made for insuring that the advancing edges of the discs 10 shall lie snugly against the plate 22, as a faulty engagement of the discs 10 by the rollers 13 might result in the deforming of the edges of the discs and in destroying the synchronism of the feeding mechanism with respect to the plunger.

The rack 14 is actuated by a pinion 29, carried by a shaft 30, that is, in turn, actuated by a pinion 31, engaging a rack 32, slidably mounted in the base 2 and connected to a link 34, constituting a portion of the interconnecting mechanism E. Accordingly, as the link 34 is moved forwardly and backwardly, the plates 16 and 18 are given a reciprocating motion that advances the lowest disc 10 and riffles the remaining discs preparatory to the next advancing stroke of the plate 16.

Referring to Figures 3 and 4, the feed rollers 13 are continuously driven by a chain 35, connected to the lower roller 13, provided with a gear 36, meshing with a gear 37 on the upper roller.

A tensioning device 38, having a sprocket 39, is mounted on the plunger mechanism B. The tension on the rollers 37 is controlled by springs 40 and thumb screws 41, carried by the frame 11.

As the discs 10 are advanced to the rollers 13, they pass therethrough and are engaged by a guide 42 and supported by an adjustable table 44, the position of which is controlled by a spring 45, a set screw 46 and a lug 47, carried by the plunger B. The distance between the table 44 and the guide 42 may be varied in accordance with the depth of the discs 10. As the discs 10 are moved over the table 44 in accordance with the movement of the disc through the rollers 13, the table 44 is adjusted in accordance with the diameter of the discs, and to insure that a disc 10 is moved over the table 44 into the plunger mechanism B in synchronism with the movement of a new disc 10 through the rollers 13. For this purpose, the guide 42 is provided with slots 48 and bolts 49, and the table 44 is carried by rods 50, the position of which is controlled by set screws 51. The base 2 is provided with a plurality of outwardly projecting fingers 52 that mesh with corresponding fingers 53 carried by the table 44, to accommodate for the adjustment of the position of the table 44 relative to the base 2 and to provide a continuous surface over which the discs may travel.

The plunger mechanism or cap forming head B comprises an outer barrel 54, carrying a die 55, at its bottom for stamping discs from paper when fed from the rollers D, as is described in our copending application. Within the barrel 54 is mounted a sleeve 55, carrying a punch 57 that cooperates with the die 55 for punching paper discs from paper fed by the rollers D. Within the sleeve 56, a plunger 58 is mounted that terminates in a ram 59, having a stripper 60 carried by a rod 61 extending longitudinally thereof. A spring 62 normally biases the stripper 60 in a downward position with respect to the plunger 58.

The sleeve 56, plunger 58 and rod 61 are all actuated by several rollers 64 positioned in the grooves in the cam faces 62. The construction of the several face cams 62 and their sequence of operation is fully described in our copending application and the description is not repeated in the present application, since the details thereof constitute no part of the present invention except as the operation of the plunger mechanism B effects the operation of the feeding mechanism A.

In the operation of the plunger mechanism B, the sleeve 56 is moved downwardly to strike out a disc of paper within the die 55. The disc is then pressed into the body of a can held by a

mandrel on an endless conveyor. After the paper disc has been driven into the can body, the ram 59 is withdrawn and the can is held by the stripper 60. After the ram 59 has been retrieved to its initial position, the stripper 60 is withdrawn by the action of the spring 62.

A feeding mechanism D comprises rollers 65 and adjustable rollers 66, each of which has a cam surface for feeding a continuous strip of paper to the plunger mechanism B when it is desired to punch out the discs during the operation of the plunger mechanism. For certain classes of work, it is difficult to secure perfect registry of the die 55 with printed matter on the paper being fed to the plunger, and under such circumstances, it may be desirable to feed the preshaped discs to the plunger mechanism B by the feeding mechanism A. The roller 65 is driven by a chain 66 from a pulley 67, carried by a shaft 68 that drives the cam faces 62. A tensioning device 69 is provided for the chain 66. The link 34 is eccentrically mounted on to the roller 65, and accordingly the driving mechanism for the plunger B actuates the feeding mechanism D and the feeding mechanism A.

As the roller 65 turns, it imparts a reciprocating motion to the link 34 and the rack 32 that is transmitted to the plate 16 for feeding discs 10 into the rollers 13 in synchronism with the movement of the plunger mechanism B. As each successive disc passes through the rollers 13, it crowds the preceding disc into the die 15 below the ram 59.

In the operation of the feeding mechanism, a pile of discs 10 are placed between the supports 7 and 9. The supply of discs 10 may be renewed continuously without interrupting the operation of the feeding mechanism. As the plunger mechanism B is operated, the reciprocating motion is transmitted to the rack 32 and the rack 14, with a result that with the stroke of the latter, the lower disc 10 is advanced into engagement with the feed rollers 13.

By reason of the gripping action of the ports 23 and the yieldably mounted gripper 25, each advancing disc 10 is smoothed and held in firm engagement with the plate 22 over which it is advanced. By reason of the location of the suction gripper 24, the advancing edge of each disk 10 is firmly held in position to be positively engaged by the rollers 13 upon the initial engagement therewith, thereby eliminating any tendency for the feeding mechanism to get out of step with the plunger mechanism B, or to injure the edges of the discs 10 by improved engagement with the rollers 13.

When it is desired that the can ends be provided with printed or embossed legends, use is made of the modification illustrated in Figures 7, 8 and 9. Much of the structure shown in these views is identical with that of the other figures and similar reference numerals are employed to designate corresponding elements. In order to print or emboss the discs 10 as they are fed to the can making machine, the upper feed roller 13 is provided with a raised printing or embossing portion 70. The roller 13 is reciprocable with its bearing block 13*b* in the frame 11 as already described. A rubber inking roller 71 is also journaled in the bearing block which engages the roller 13 so that the roller 71 contacts only with the raised portion 70 of the upper roller 13.

Ink is supplied to the inking roller 71 from an inking fountain 72 supported on brackets 73 and 74. The brackets 73 and 74 rest on the upper ends of the frame 11 and are secured thereto by means of screws 75. The adjusting screws 76 for the bearing block 13*b* carrying the rollers 13 and 71 corresponding to the adjusting screws 41 of Figures 1, 3, etc., are threaded through the lower horizontal portion of the brackets 73 and 74 which rest on the frame 11.

At one end of these horizontal portions of the brackets, journal bearings 77 are formed for a shaft 78. A pulley 79 fixed to the shaft 78 cooperates with a pulley 80 on the shaft carrying the lower roller 13 so that the shaft 78 is driven therefrom. Collars 81 on the shaft 78 maintain it in fixed relation with the bearings 77. A distributor roller 82 is mounted on the shaft 78 so as to be reciprocable therealong. The roller is so mounted that it rotates with the shaft. A collar 83 on the shaft affords a slidable bearing for one end of the roller and a spring 84 urges the roller toward the left as shown in Figure 8. The left-hand end of the roller has a cam surface 85 formed thereon and a cam roller 86 is journaled in a holder 87 which is screwed to a projecting lug 87*a* on the bracket 73. As the shaft 78 rotates, engagement of the roller 86 with the cam surface 85 causes the longitudinal reciprocation of the roller 82 on the shaft.

A cam 88 is secured to the shaft 78 and serves to actuate a follower 89 to operate a pair of levers 90 which are fixed to pivot shaft 91. The follower 89 is integral with one of the levers 90. A pickup roller 92 is rotatable on center points 93 in the levers 90. A fountain roll 93' is journaled for rotation in the inking fountain 72 and is provided with a ratchet wheel 94 on its shaft. A spring-pressed pawl 95 on one of the levers 90 serves to turn the fountain roll 93' intermittently as the levers 90 are oscillated by the engagement of the high point of the cam 88 with the follower 89.

In order to transfer the ink from the distributor roll 82 to the inking roll 71, we provide a rubber roller 96. The roller 96 has a shaft which is slidably supported in slots 97 in the brackets 73 and 74 by means of leaf springs 98. A "doctor" roller 99 floats on the rollers 71 and 96. The shaft of the roller 99 is journaled in slots 100 in the brackets 73 and 74.

Figures 7 and 8 show the relative positions of the printing and inking mechanism when there is no disc between the feed rollers 13. When the feeding device advances a disc to the rollers 13, the upper roller 13 is lifted because of the thickness of the disc, as well as the guide finger 42. The upward movement of the upper roller 13 causes the rubber inking roller 71 to be raised by a corresponding amount. The upper roller 13 and the rubber inking roller 71 are rigidly spaced in their reciprocable bearing block 13*b*, as previously described, to prevent the application of ink from the inking roller 71 to the feed roller 13, except on the raised portion of the latter. By the time the inked printing portion of the roller 13 has been rotated to its printing position, the disc 10 being fed will have advanced into position for receiving the impression.

The upward movement of the rubber inking roller 71 shifts the "doctor" roller 99 slightly and the leaf springs 98 support the rubber roller 96 to maintain the latter in engagement with both the "doctor" roller 99 and the distributor roller 82. The latter is directly driven through its shaft 78, as already described, and serves to cause the intermittent operation of the fountain rolls 93' and the pickup roller 92 which transfers ink from the fountain to the distributor roller.

Any desired legend may thus be applied to the disc forming the can ends. For example, the capacity of the can may be imprinted upon the end thereof. The raised portion 70 of the upper roller 14 may be in the form of a removable insert so as to permit the printed legend to be altered if desired.

We have provided a can machine in which there is a feeding mechanism for printing and supplying paper discs, that is characterized by the use of a vacuum system for insuring that each disc shall be brought into positive engagement with the feeder rolls, thereby eliminating any unnecessary loss of time in the feeding operation due to failure of the feeding rolls to immediately engage the advancing discs. At the same time, a positive feed insures perfect synchronism between the operation of the feeder rolls and the plunger to which the discs are fed. Provision is made for using the feeding mechanism for discs of different diameters by providing plates of different lengths and radii of curvature corresponding to the curvature of discs of different diameter, and an adjustable table is interposed between the feed rolls and the plunger. Another important feature of our invention is the lug that riffles the stack of discs during each feeding operation, thereby feeding the lower disc preparatory to disengagement with the feeding plate. The positioning of the gripper in close proximity to the feed rolls also assists in insuring positive feed action.

The provision of a vacuum system in connection with feed mechanism removes any dirt or lint that may be freed from the discs and the accumulation of which might impair the feeding operation.

While we have described a can machine for applying paper discs to paper cans, it is to be understood that the machine is adapted for uses in connection with materials other than paper and with other types of feeding mechanisms, and that the use of the can machine for such purposes is contemplated within the spirit of the invention and the scope of the appended claims.

We claim:

1. In a can-making machine, a reciprocable plunger, a ram thereon, a stripper movable axially of the ram, a cam shaft having a cam thereon for actuating said plunger, driving means for the cam shaft, a reciprocable disc-feeding means for positioning discs below the ram, a rack and pinion for actuating said means, a reciprocable rack and a pinion cooperating therewith for actuating said first-mentioned pinion, and a crank arm driven by said cam shaft for actuating the last-mentioned rack.

2. In a can-making machine, a reciprocable plunger, a cam shaft having a cam thereon for reciprocating said plunger, a drive for the cam shaft, means for feeding discs below the plunger comprising a reciprocable slide, a rack bar on the slide, a shaft adjacent the slide having a pinion cooperating with said rack, a second pinion on said shaft, a reciprocable rack for actuating the second pinion, a crank arm driven by said cam shaft for reciprocating the last-mentioned rack, rolls for forwarding discs advanced by said disc feeding means, and means driven from said cam shaft for driving said rolls.

3. In a can-making machine, a plunger for engaging can ends, a cam shaft having a cam thereon for engaging said plunger, a drive for the cam shaft, strip and disc-feeding means associated with said plunger, the strip feeding means comprising opposed rolls having a portion of their peripheries recessed for intermittently engaging and forwarding a strip, and means for driving said rolls from said cam shaft, said disc-feeding means comprising a reciprocable slide for actuating a disc, feed rolls for advancing a disc actuated by said slide, said slide and rolls both being driven from said cam shaft.

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