July 22, 1924. 1,502,220

I. A. WATROUS

PAPER BOX MACHINERY

Filed Nov. 16, 1923 4 Sheets-Sheet 1

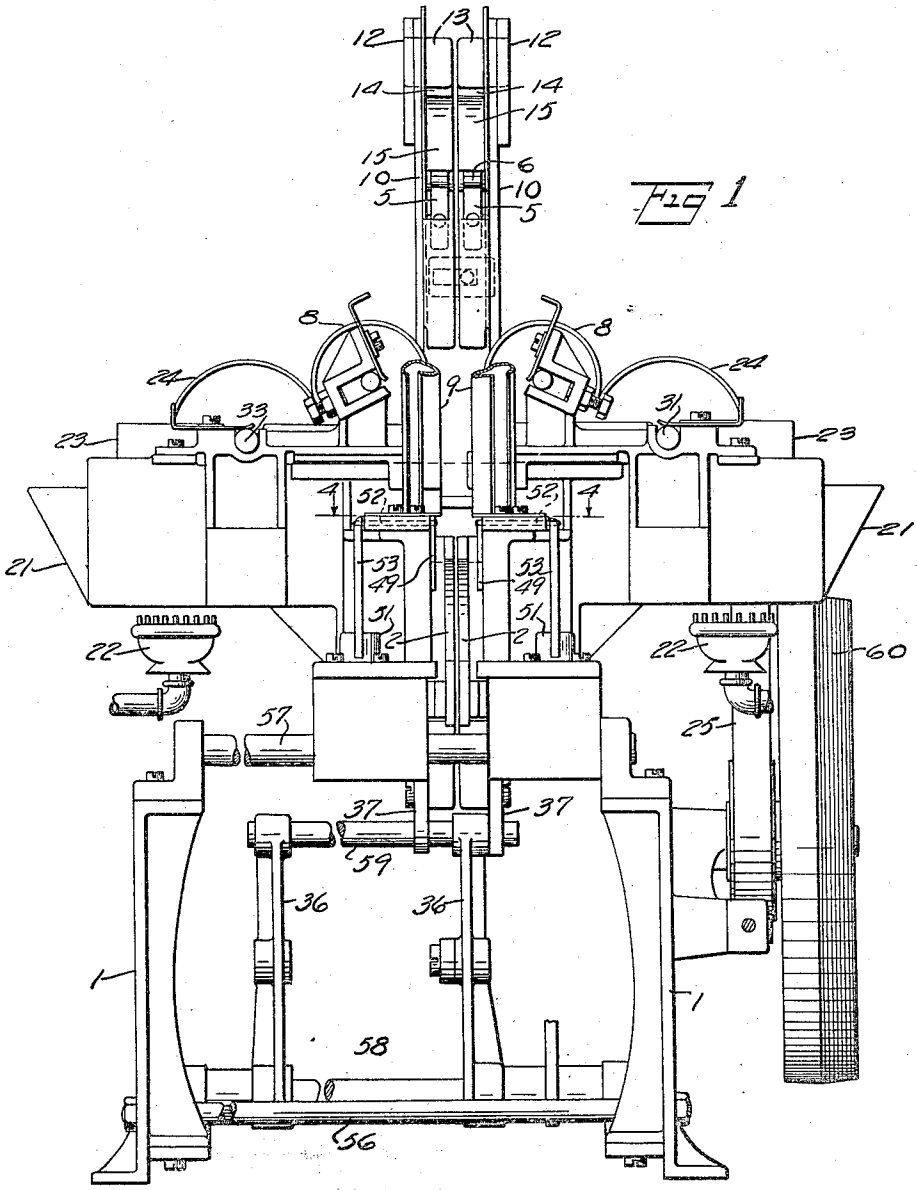


Fig 1

INVENTOR
Isaac A. Watrous.
BY
Wallace White
ATTORNEY

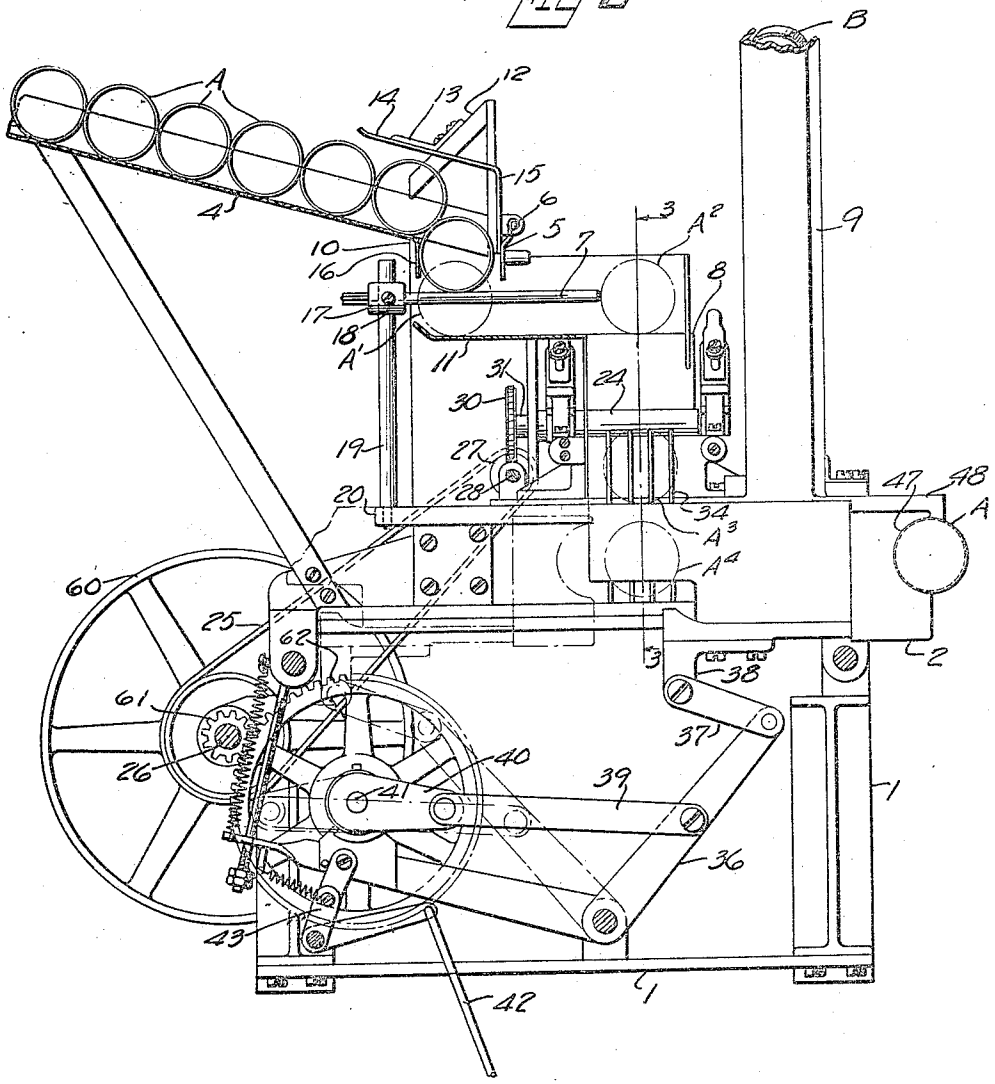
July 22, 1924. 1,502,220

I. A. WATROUS

PAPER BOX MACHINERY

Filed Nov. 16, 1923 4 Sheets-Sheet 2

FIG 2



INVENTOR

Isaac A. Watrous

BY

Wallace White

ATTORNEY

July 22, 1924. 1,502,220

I. A. WATROUS

PAPER BOX MACHINERY

Filed Nov. 16, 1923 4 Sheets-Sheet 3

FIG 3

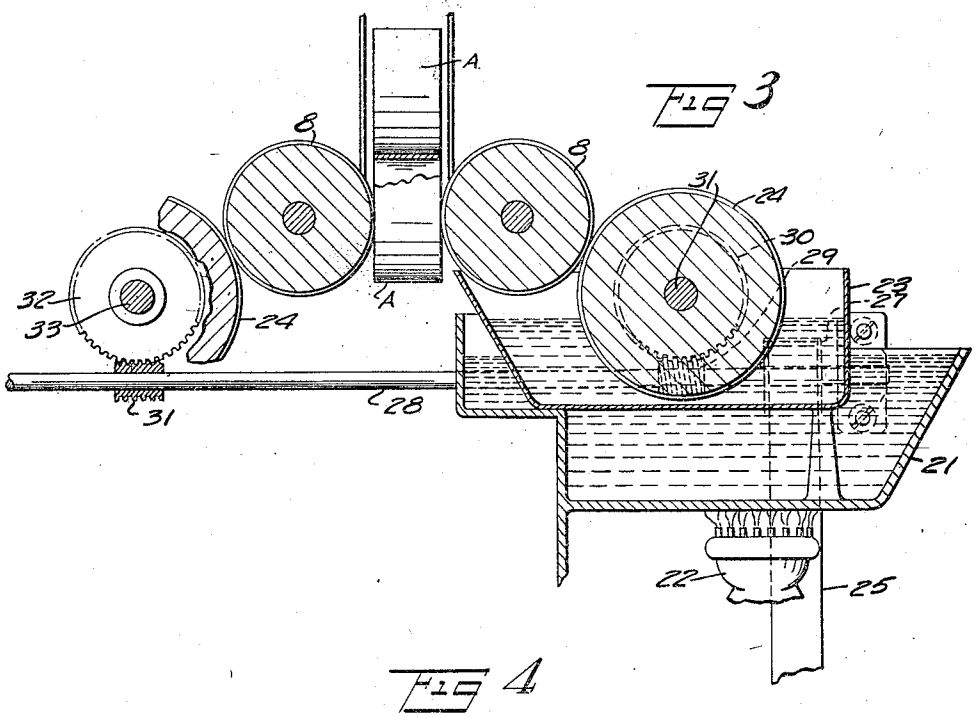
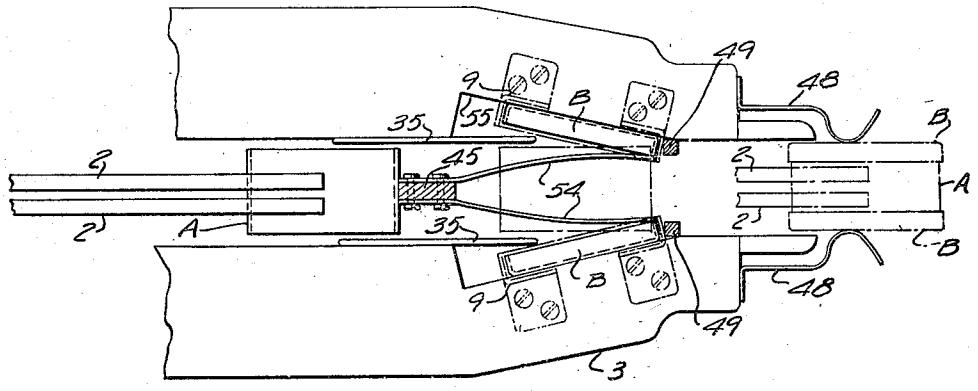


FIG 4



INVENTOR

Isaac A. Watrous.

BY

Wallace White

ATTORNEY

July 22, 1924. 1,502,220

I. A. WATROUS

PAPER BOX MACHINERY

Filed Nov. 16, 1923 4 Sheets-Sheet 4

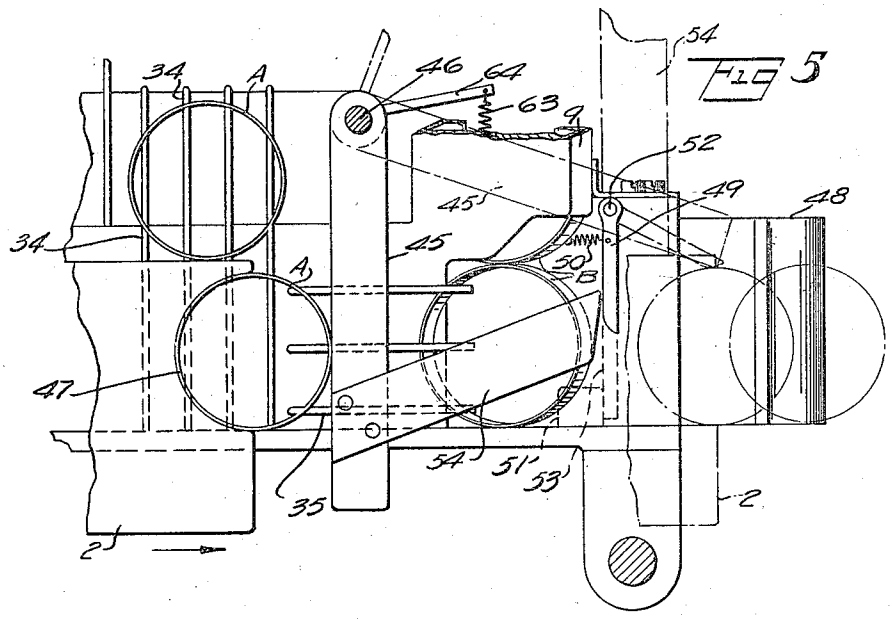


FIG 5

INVENTOR
Isaac A. Watrous.
BY
Wallace White
ATTORNEY

Patented July 22, 1924. 1,502,220

UNITED STATES PATENT OFFICE.

ISAAC ALLEN WATROUS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO UNION PAPER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

PAPER-BOX MACHINERY.

Application filed November 16, 1923. Serial No. 675,097.

To all whom it may concern:

Be it known that I, ISAAC ALLEN WATROUS, a citizen of the United States of America, residing at 305 E. Washington Avenue, Bridgeport, Connecticut, have invented new and useful Improvements in Paper-Box Machinery, of which the following is a specification.

My invention relates to machines for the making of paper boxes, cans, and the like, and has for its principal object the provision of mechanism for applying the caps or heads to the box or can bodies. More particularly, the objects of my invention are to provide means for receiving the tubes or box bodies in a magazine from a source of supply, and delivering them as needed to the capping mechanism; and for similarly receiving the caps and delivering them from a magazine to the capping mechanism; effecting the application of the caps to the can bodies, and delivering the finished product, with the caps pressed home, and if desired glued in place, all automatically and with precision, and at a rapid rate. A further object is to provide a machine of this type which may by adjustment or slight interchange of parts be made to operate upon boxes of different diameters or thicknesses and lengths. Other minor features of invention are hereinafter set forth, and my invention consists in the constructions, combinations and arrangements of parts herein described and claimed and illustrated in the accompanying drawings.

In these drawings, in which similar reference characters designate corresponding parts in all views, I have illustrated a preferred embodiment of the invention, showing a machine particularly adapted for operating upon cylindrical boxes or cans.

Figure 1 is an elevation of the machine from the delivery end;

Figure 2 is a vertical, longitudinal section taken approximately on the center line of Fig. 1, looking to the right;

Figure 3 is a detail section taken approximately on the line 3—3 of Figure 2, looking in the direction of the arrows;

Figure 4 is a detailed plan view of the cams 3 and plunger 2 showing in part how a can body engages the caps; and

Figure 5 is a detail showing substantially the same parts as Figure 4, in approximately central vertical longitudinal section.

Referring to these drawings, the machine comprises a frame 1 upon which is mounted a reciprocal plunger 2 adapted to receive a can body A and propel it into engagement with a pair of caps B, carrying the caps B along between guide-plates or cam plates 3 and ejecting the can with caps applied from the machine.

The can bodies are fed from a suitable magazine or chute 4 where they travel under the influence of gravity to the position A^1, being held from further movement by the stop gate 5, which is simply a weighted member pivoted at 6 to a suitable part of the machine to be later described. Carried by the plunger 2, so as to reciprocate therewith, is a suitable rod 7 which is drawn back out of the way behind the tube which falls into the position A^1, when the plunger is withdrawn to the back of its stroke, as shown in dot and dash lines. The rod 7 presses against the can in the position A^1 on the forward stroke of the plunger 2, and carries the can to the position A^2, from which the can is carried downward by the glue rollers 8, passing on downward until it rests upon the flat top of the plunger 2, in the position A^3 where it remains until the next backward stroke of the plunger, and as soon as the plunger has withdrawn from beneath the can body A, it drops down to its position A^4 in front of the plunger and ready to be engaged thereby on the next forward stroke.

The caps are delivered by suitable means to the cap magazines 9 which deliver a cap B at each side of the path to be taken by the body A when forced forward by the plunger 2, these caps resting with their flat surfaces against the cam plates 3, so held by suitable means to be described. (Fig. 4.) The position of the magazines 9, and their angle with respect to the direction of movement of the can bodies, are such that the caps B are delivered with the forward parts of their flanges projecting inward into the line of travel of the can body, so that on forward operation of the plunger the can body engages the forward end of the caps, carrying them forward between the cam plates 3, permitting the latter to force the caps over and on to the ends of the can body.

To go more into detail, the chute or magazine for the can bodies is supported upon suitable uprights 10, which serve as end guide-plates during the descent of the can bodies from the chute to a horizontal platform 11. The upper ends of these uprights are formed with a suitable flange 12 arranged at an angle of approximately 45° to the vertical, and upon these flanges by a suitable clamp 13 there is held a plate 14 at such an angle as to be approximately parallel with the chute to prevent the can bodies from buckling one upon the other at the end of the chute; this plate having a downwardly projecting portion 15 adapted to stop the travel of the can bodies down the chute and direct them downwardly toward the platform 11. The stop gate 5 is preferably mounted upon this portion 15 of the said plate 14. Thus when tubes of larger or smaller diameter are to be operated upon, the plate 14 may be adjusted upwardly or downwardly upon the said inclined flange 12, the incline being such that the distance between the said plate 14 and the chute 4 will always be approximately the same as the distance between the portion 15 of the plate and the opposed vertical wall 16 at the end of the chute, between which parts 15 and 16 the can bodies descend, a single adjustment thus sufficing to control the passage of bodies of different sizes, and the adjustment at the same time bringing the stop gate 5 into proper position for whatever size can body the machine is set.

The rod 7 for moving the can bodies one by one along the platform may need to be adjusted for different sized bodies; and this may be effected by supporting it by means of a suitable clamp 17 and set screw 18 upon a vertical rod 19 carried by the arm 20 suitably secured to the plunger 2.

The gluing mechainsm is substantially that in common use for similar purposes, comprising a container or water jacket 21 to which heat may be applied, as by a gas burner 22 and a glue pan 23 suitably supported in said container, having a roller 24 mounted for rotation in the glue and having the upper part of the roller projecting therefrom and in contact with a second roller 8 for taking sufficient glue from the first roller and applying it to the ends of the can body A as it descends from the position A^2 to the position A^3. The first glue roller 24 is preferably driven by suitable positive means, such as a belt 25 from the drive shaft 26 which drives the wheel 27 mounted upon the shaft 28 carrying a worm 29 in mesh with the worm wheel 30 which is mounted upon the shaft 31 carrying the first glue roller 24. The second glue roller 8 derives its motion from the first, and applies a downward frictional force to the can body to positively carry the same through between the rollers and deliver it below to the position A^3 resting upon the plunger 2 until the completion of the return stroke of the latter.

Such a gluing arrangement may be disposed at each side of the machine, so that glue may be applied to both ends of the can bodies if desired, the second set of gluing rollers being driven from the first by means of another worm 31 upon the same shaft meshing with a second worm wheel 32, upon the shaft 33 of the first glue roller 24 of the other set. In order to prevent the walls of the machine from rubbing the glue from the boxes, or becoming clogged up eventually by the glue, guide wires 34 are provided against which the ends of the tubes may travel during their downward progress, and similar wires 35 for the forward progress up to the point of application of the caps.

The mechanism for reciprocating the plunger 2 upon the ways 44 may be any type desired. As shown in the drawing, this mechanism comprises a link 36 pivoted to the frame 1 at one end, and having a link 37 connecting the other end with a depending portion 38 of the plunger 2, a connecting rod 39 running from the middle of the said link to a crank 40 driven from a shaft 41 upon the operation of a suitable clutch. Power is received from a driven wheel 60 mounted on the shaft 26 carrying a pinion 61 in mesh with the gear wheel 62 on the shaft 41 and connected therewith through the said clutch. As shown in the drawing, the plunger is preferably actuated from a foot treadle which pulls the rod 42, and a toggle joint 43 may be interposed to prevent accidental operation of the clutch. The exact form of clutch and driving mechanism is not however material, but it is desirable to provide a mechanism which can be brought into operation by the throwing of a lever, and similarly stopped at any time.

When the plunger 2 has completed a backstroke to the position shown in dot and dash lines in Fig. 2, and a can body has dropped downward from the glue rollers and from its position A^3 upon top of the plunger to its position A^4 in front of the plunger and between the cams 3, the plunger starts forward and engages the can body, which is held away from the cam plates 3 by suitable wires 35 to prevent the glue from sticking to the cam plates, and as the plunger moves forward the can body is brought against a depending weighted arm or arms 45, mounted on a shaft 46, which serves to hold the can body snugly into the recessed portion of the plunger 47, this depending arm 45 being lifted up out of the way to the position shown in dot-and-dash lines (Fig. 5) as the plunger advances and engages the caps B

delivered by the magazines 9, the can body entering the caps as shown in the detail in Figure 4.

Adjacent the ends of the cam plates 3 are positioned flat plate springs 48 disposed so as to project inwardly or toward each other more than the cam plates, and to receive the capped can at the end of the stroke of the plunger, holding the can until the next can is forced along by the plunger and pushes out the first, the spring plates 48 serving to press the caps all the way home as they are ejected from the machine.

Immediately beyond the position to which the caps are delivered by the magazines 9 are disposed fingers 49 against which the caps are pushed as they are advanced by the can body, which serve to hold the caps against the body and to ensure the rear ends of the caps being forced over the ends of the can body as they advance. These fingers are mounted upon shafts 52 having external arms 53, and are held yieldingly in position by suitable springs 50 which cause them to return to their positions after a can has passed, the position being determined by the arms 53 striking suitable stops 51.

The depending arm 45 is held upward by the plunger upon which it rests while the forward stroke is being finished, and at the start of the return stroke; and as the plunger is withdrawn the depending arm returns to its normal position, by gravity, and under the influence of a spring 63 attached to an arm 64 fixed to the shaft 46. Upon this depending arm or arms 45 is mounted a suitable plate or plates 54. As soon as a can body has taken a pair of caps out of the way, a further pair of caps is delivered by the cap magazines 9 at the sides of the plunger in the recesses 55 of the cam plates 3, and these caps are prevented from falling from their delivered position into the channel or space between the cam plates by the presence of the plunger; and upon the withdrawal of the plunger, by the plates 54 upon said depending member, which remain in position across the front of the caps and prevent them from becoming displaced until the plunger again comes forward.

In building this machine, in order that it may be useful upon cans of different diameters and different lengths, the machine is made in two sections, which may be bodily separated one from the other, upon the frame. One of the sections is preferably mounted in fixed position upon the frame, say the right-hand section in Fig. 1; and the left-hand section, being all of the parts except the frame itself to the left of the center line of the can magazine 4, the plunger and plunger channel or space between the cam plates 3, is slidable upon the rods 56, 57 of the frame of the machine, and upon the rods 58, 59 of the actuating mechanism for the plunger, the plunger itself being composed of two separate corresponding parts, as indicated in the drawings (see Fig. 4).

Thus, to adjust for cans of different lengths, it is simply necessary to loosen set screws and slide the parts mounted upon the various shafts or rods to the left of the center line, with the other accessories, as the gluing mechanism, which remain in fixed relation thereto, to the left to the desired extent.

In order to effect the adjustment for diameter of cans, it is necessary to adjust the plates 14 on the can feed magazine 4, and to take off the cap magazines 9 and replace them by magazines of suitable size, and to replace the forward recesses carrying portion of the plunger by a similar portion having a recess 47 of suitable radius.

In the foregoing description of the various parts, the operation of the device, which is comparatively simple, has been fully indicated.

Having now described my invention I claim and desire to secure by Letters Patent:

1. A machine for applying caps to the ends of paper boxes comprising means for propelling the box body in a direction at right-angles to its longitudinal axis; means for feeding caps in a direction substantially at right-angles to the plane of travel of said axis, into the path of travel of the box, said means arranged to deliver the caps at an angle to the axis of the box to permit of the box passing the rearward portion of the flange of the cap and engaging the forward portion thereof; cam surfaces between which said box is advanced, adapted to press the caps upon the ends of the box; and spring plate means for pressing the caps home.

2. A machine for applying caps to the ends of paper boxes comprising a pair of cam plates substantially parallel and spaced apart the length of a box, and having opposed recesses having their walls inclined to meet the surfaces of said cam plates at the forward ends of the recesses, a reciprocating plunger adapted to carry a box body through between said cam plates, and means for feeding caps to said recesses to be engaged by the box body and affixed to the ends thereof on forward movement of said plunger.

3. In a machine as in claim 2, rollers adapted and arranged to apply glue to the ends of the box body, and to advance the box body into the path of said plunger.

4. In a machine for applying caps to the ends of paper boxes including a plunger, means for feeding the boxes to the plunger comprising an inclined chute, an abutment at the foot thereof to direct the boxes downwardly, a platform to receive the boxes, a

yieldable stop gate to prevent a box on reaching the platform from moving thereon, means to advance a single box along said platform past said gate over the edge of the platform, and driven rollers to receive said box and carry the same downwardly to drop in position in front of said plunger.

5. In a machine for applying caps to the ends of paper boxes including a plunger, means for feeding the boxes to the plunger comprising an inclined chute, an abutment at the foot thereof to direct the boxes downwardly, a platform to receive the boxes, a yieldable stop gate mounted on said abutment and depending therefrom to prevent a box on reaching the platform from moving thereon, means to advance a single box along said platform past said gate over the edge of the platform, and driven rollers to receive said box and carry the same downwardly to drop in position in front of said plunger.

6. In a machine for applying caps to the ends of paper boxes including a plunger, means for feeding the boxes to the plunger comprising an inclined chute, terminating in a downwardly extending guide wall; a plate having one portion substantially vertical and the other portion substantially parallel to the incline of the chute, adjustable angularly toward the bottom of the chute to maintain by a single adjustment the distance between the plate and the chute and the vertical portion of the plate and said downwardly extending guide wall, substantially the same for whatever size box the machine is set; a platform to receive the boxes, a yieldable stop gate to prevent a box on reaching the platform from moving thereon, means to advance a single box along said platform past said gate to the edge of the platform, and driven rollers to receive said box and carry the same downwardly to drop in position in front of said plunger.

7. In a machine for applying caps to the ends of paper boxes including a plunger, means for feeding the boxes to the plunger comprising an inclined chute, an abutment at the foot thereof to direct the boxes downwardly, means to prevent the boxes from piling up at the end of the chute, a platform to receive the boxes, a yieldable stop gate mounted on said abutment and depending therefrom to prevent a box on reaching the platform from moving thereon, means to advance a single box along said platform past said gate over the edge of the platform, and driven rollers to receive said box and carry the same downwardly to drop in position in front of said plunger.

8. In a machine for applying caps to the ends of paper boxes including a plunger, means for feeding the boxes to the plunger comprising an inclined chute, an abutment at the foot thereof to direct the boxes downwardly, a platform to receive the boxes, a yieldable stop gate to prevent a box on reaching the platform from moving thereon, means to advance a single box along said platform past said gate over the edge of the platform, driven glue rollers to receive said box and carry the same downwardly to drop in position in front of said plunger, and wire guides for the ends of said boxes during their descent.

9. A machine for applying caps to the ends of paper boxes comprising a pair of cam plates substantially parallel and spaced apart the length of the box, and having opposed recesses having their walls inclined to meet the surfaces of said cam plates at the forward ends of the recesses, a reciprocating plunger adapted to carry a box body through between said cam plates, said plunger having a recessed portion for the reception of the box body, means for feeding said caps to said recesses to be engaged by the box body and affixed to the ends thereof on forward movement of said plunger, and yielding means for maintaining the box body in the said recess of the plunger to ensure accurate engagement of the box with the caps.

10. A machine for applying caps to the ends of paper boxes comprising a pair of cam plates substantially parallel and spaced apart the length of the box, and having opposed recesses having their walls inclined to meet the surfaces of said cam plates at the forward ends of the recesses, a reciprocating plunger adapted to carry a box body through between said cam plates, said plunger having a recessed portion for the reception of the box body, means for feeding said caps to said recesses to be engaged by the box body and affixed to the ends thereof on forward movement of said plunger, and a hinged depending arm for maintaining the box body in the said recess of the plunger to ensure accurate engagement of the box with the caps.

11. A machine for applying caps to the ends of paper boxes comprising a pair of cam plates substantially parallel and spaced apart the length of the box, and having opposed recesses having their walls inclined to meet the surfaces of said cam plates at the forward ends of the recesses, a reciprocating plunger adapted to carry a box body through between said cam plates, said plunger having a recessed portion for the reception of the box body, means for feeding said caps to said recesses to be engaged by the box body and affixed to the ends thereof on forward movement of said plunger, and a hinged depending arm for maintaining the box body in the said recess of the plunger to ensure accurate engagement of the box with the caps, said arm

having a portion projecting forwardly therefrom and adapted when in normal position to prevent the caps ready for engagement from falling into the plunger channel.

12. In a machine for applying caps to the ends of paper boxes, the combination comprising cam plates, a reciprocating plunger for carrying a box body through between said cam plates, a magazine for feeding the box bodies to said plunger, magazines associated with said cam plates for feeding caps thereto, said plunger and box body magazine being divided and the portions movable with their associated parts transversely on adjusting the cam plates toward or away from each other to enable the machine to act upon boxes of different lengths.

13. In a machine for applying caps to the ends of paper boxes, the combination comprising cam plates, a reciprocating plunger for carrying a box body through between said cam plates, a magazine for feeding the box bodies to said plunger, and magazines associated with said cam plates for feeding caps thereto, the cap magazines being replaceable by interchangeable magazines for caps of different diameters.

14. In a machine for applying caps to the ends of paper boxes, the combination comprising cam plates, a reciprocating plunger for carrying a box body through between said cam plates, a magazine for feeding the box bodies to said plunger, and magazines associated with said cam plates for feeding caps thereto, the cap magazines being replaceable by interchangeable magazines for caps of different diameters, and the portion of the plunger carrying said recess being replaceable for box bodies of different diameters.

15. In a machine for applying caps to the ends of paper boxes, the combination comprising means for feeding the boxes to the plunger comprising an inclined chute, an abutment at the foot thereof to direct boxes downwardly, a buckling plate to prevent boxes from piling up at the end of the chute, a platform to receive the boxes, a yieldable stop gate mounted on said abutment and depending therefrom, to prevent a box on reaching the platform from moving thereon, the abutment and buckling plate being adjustable on an angle of approximately 45°, for different diameters of boxes, and to bring the stop gate into operative position for whatever size box.

16. In a machine for applying caps to the ends of paper boxes, the combination comprising a reciprocable plunger adapted to carry a box body through the machine, means for feeding a box body to said plunger at each reciprocation thereof, means for feeding the caps for each box, a source of power, glue rollers continuously driven from said source of power, means for transmitting power to said plunger, and a clutch included in said latter means to stop the plunger without shutting down the machine.

In testimony whereof I have signed my name to this specification.

ISAAC ALLEN WATROUS.