Nov. 20, 1928. 1,692,274

M. J. MALLOY ET AL

DEVICE FOR REMOVING CAPS FROM PAPER CORES

Filed Dec. 1, 1927 2 Sheets-Sheet 1

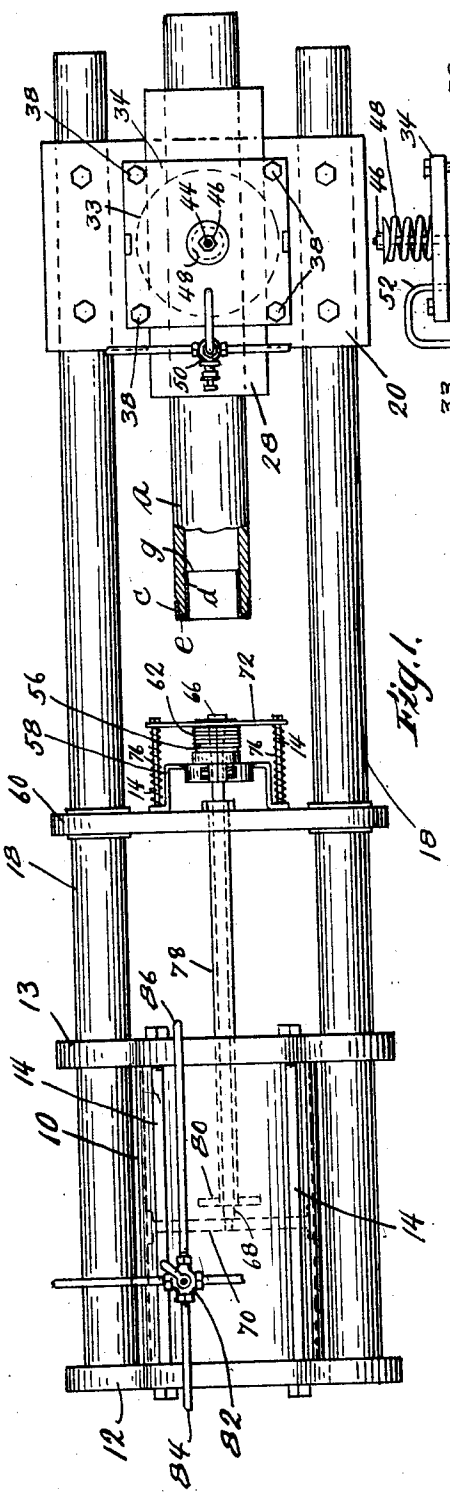


Fig. 1.

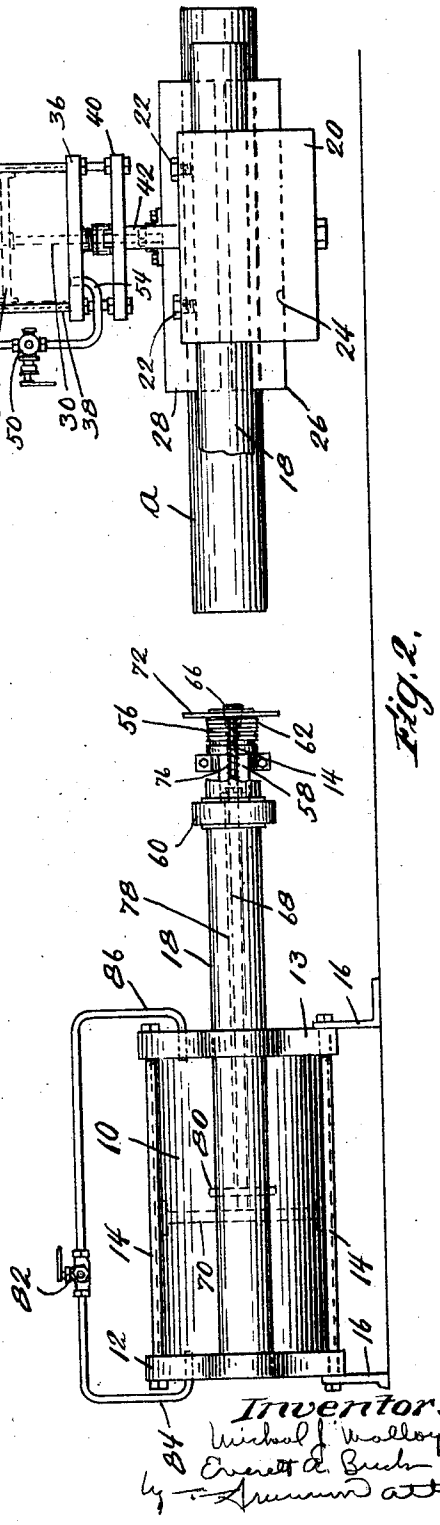


Fig. 2.

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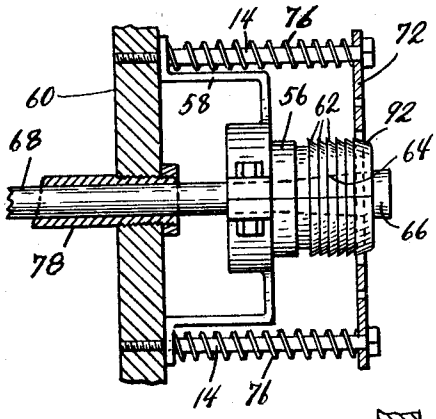
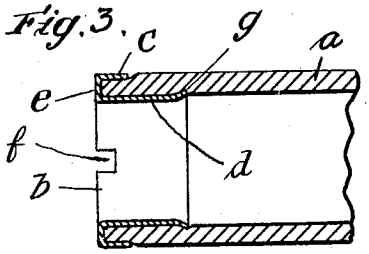


Fig. 3.



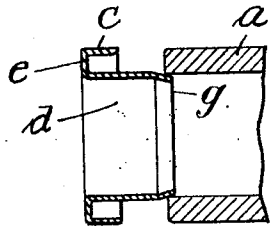


Fig. 8.

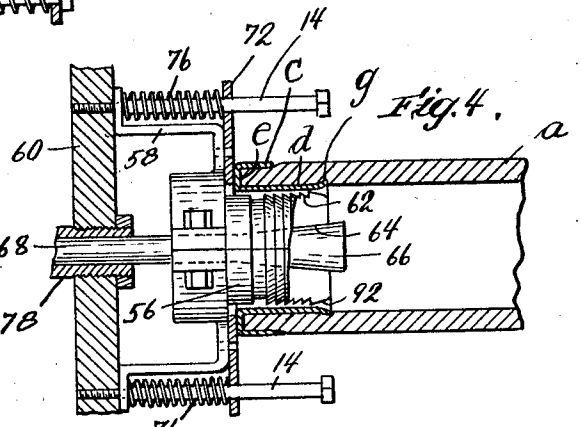


Fig. 4.

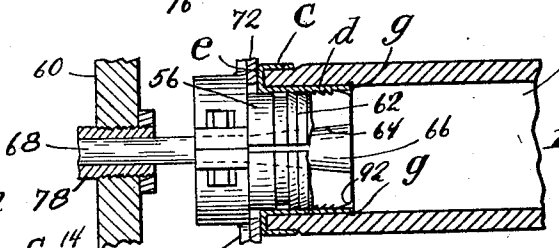


Fig. 5.

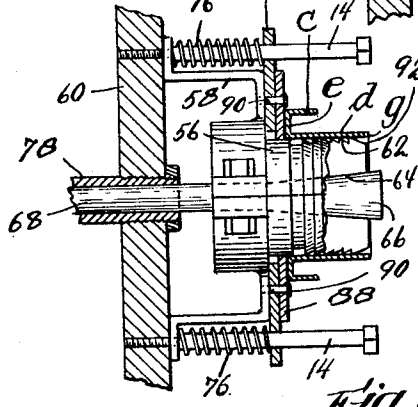


Fig. 6.

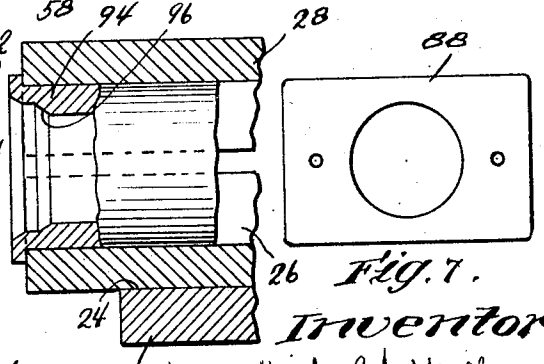


Fig. 7.

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Patented Nov. 20, 1928. 1,692,274

UNITED STATES PATENT OFFICE.

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DEVICE FOR REMOVING CAPS FROM PAPER CORES.

Application filed December 1, 1927. Serial No. 237,104.

This invention relates to paper making and has particular reference to the cylindrical paper tubes or cores on which the paper is wound.

The paper tubes or cores are provided with metal end caps or ferrules which have concentric cylindrical sections between which the wall of the core is received, and one section, usually the inner section, has its inner edge expanded into the wall of the core, whereby to secure the cap firmly onto the core.

It is often found necessary to shorten the cores, due to changes in widths of paper, which is accomplished by removing the cap from one end of the core, cutting off the desired amount of the core, and again capping the end of the core.

It is an object of this invention to provide a machine for removing the cap from the end of a paper core without damage either to the cap or to the core, so that the same cap can be replaced on the end of the shortened core.

Another object of the invention is to provide the cap-removing machine with means by which it can re-shape the removed caps so that they can be applied readily to the core.

Fig. 1 is a plan view of the machine embodying this invention.

Fig. 2 is a side elevation of the machine of Fig. 1.

Fig. 3 is a detail illustrating the relative positions of the cap-extractor and the end of the paper core prior to the cap-pulling operation.

Fig. 4 is a detail similar to Fig. 3 but with the extractor loosely located within the cap.

Fig. 5 is a detail similar to Fig. 4 but with the extractor expanded into gripping engagement with the cap.

Fig. 6 is a detail illustrating the extractor and the die for upsetting the end of the cap.

Fig. 7 is a plan view of the extractor-locking plate.

Fig. 8 is a sectional detail of the upset cap in position to be applied to the paper core.

The paper core with which this invention is concerned comprises a paper tube or cylinder *a*, Fig. 3, of substantial thickness and having a metal cap *b* on the end thereof. Said cap comprises spaced concentric cylindrical outer and inner walls *c* and *d* providing a space therebetween within which the end of the core-wall is received when the cap is forced thereon; and said walls are integrally connected by the radial end wall *e* which overlies the end of the core. The core and the cap may have a notch *f* in the end thereof by which the core and the roll of paper thereon may be rotated. The inner wall *d* is of considerably greater axial length than the outer wall and the free edge *g* thereof is reflexed or forced outwardly thus to become imbedded into the wall of and securely grip the core.

The cap-removing and re-shaping machine here shown as embodying the invention includes a horizontal cylinder 10, Fig. 1, secured between vertical plates 12 and 13 which comprise cylinder heads and are clamped together by bolts 14, and are supported by depending feet 16. Cylindrical rods 18 are carried by said plates 12 and 13 on diametrically opposite sides of the cylinder and extend horizontally forward thereof and provide guideways or rails for a cap-extractor and also for a tube-clamp.

The tube-clamp includes a block or carrier 20 which is slidable longitudinally on said rails and can be clamped in any set position thereon by set-screws 22 and has a longitudinal channel 24 therein in which tube-clamping blocks 26 and 28 are received. Said blocks have complementary semi-cylindrical recesses therein which are co-axial with the cylinder 10. The lower block 26 rests in the channel 24 while the upper block can be raised and lowered out of and into gripping relation with a core disposed between the blocks.

The movable upper block 28 is carried by the lower end of a vertical piston rod 30 which carries at its upper end a piston 32 operating in a vertical cylinder 33 secured between the cylinder heads 34 and 36 by bolts 38 and carried by and spaced above a supporting plate 40 by extensions of the aforesaid bolts. Said cylinder is supported in elevated position above said movable clamping block by a bracket 42 which is secured to said supporting plate and also to said carrier 20 on opposite sides of said clamping blocks. An extension 44 of the piston rod 30 is passed through the upper cylinder head 34 and has a nut 46 adjustably screw-threaded thereon

which bears against the upper end of a compression spring 48 surrounding said extension and seated upon said upper cylinder head and providing means by which the clamping pressure on the paper core can be regulated.

The piston 32 is operated by air pressure controlled by a four-way cock 50 of any usual or suitable construction. Pipes 52 and 54 lead respectively from said valve to and communicate with the upper and lower ends of the cylinder so that, by the proper operation of said valve, the upper clamping block can be pressed down upon a paper core and can be raised to permit the removal of the core. The clamping pressure on the core can be regulated by a suitable adjustment of the spring 48, thus to avoid crushing the core by the application of excessive air pressure.

The cap extractor 56 comprises a cylindrical segmental expansible collet of any usual or suitable construction which is carried by a yoke 58 secured to a cross-bar 60 slidable on the rails 18 between the cylinder 10 and the core clamp. Said extractor is provided with a series of teeth 62 on its outer periphery which are adapted to be forced into gripping engagement with the inner wall of the core-cap, to remove the cap. The expander has a tapered axial passage 64 therein in which a tapered plug 66 is movable to the left Fig. 1, to expand the extractor and to the right to allow it to contract. Said plug is carried by the free end of a piston rod 68 which has a piston 70 at its other end operable within the cylinder 10. A stripper plate 72 encircles said extractor and is slidable axially on bolts 14 carried by said crossbar 60 on opposite sides of the extractor. Said plate is held yieldingly in its outermost position shown in Figs. 1 and 3 by compression springs 76 when free from engagement with the core-cap and is adapted to be pressed against the yoke by the cap when the extractor is therein and to press the cap automatically off the extractor after the cap has been detached from the core and the expander has been contracted.

Said cross bar 60 is adapted to be moved along said rails 18 by said piston 70 and, to this end, has fixed thereto a tube 78 which surrounds and is slidable on said piston rod 68 and passes into said cylinder 10 and terminates therein with a head 80 which is close to the piston 70, so that said piston can have a small axial movement toward the right, Fig. 1, before engaging said head.

Said piston is actuated by air pressure controlled by a four-way cock 82 of any usual or suitable construction which controls the supply of pressure air to the opposite ends of the cylinder through the pipes 84 and 86.

The operation is essentially as follows: The air cock 50 is operated to admit air to the under side of the piston 32 of the core-clamp to raise the upper clamping block 28 so that a core can be inserted between the two clamping blocks with the end cap in front of the extractor. The air cock is then reversed to admit air into the upper end of the piston and clamp the core firmly in position and to exhaust the air in the lower part of the cylinder. The cock 82 is then operated in a manner to admit air to the left hand end of the cylinder 10, thus to force the piston 70 to the right and allow the extractor to contract. Continued movement of the piston causes it to engage the head 80 of the tube 78, thus to move the cross-bar 60 and the extractor toward the right and into the core-cap, or to a position as illustrated in Fig. 4, in which position the stripper plate 72 is pushed up against the yoke 58. The air cock 82 is then operated in the reverse manner, to admit air to the other side of the piston 70 and exhaust the air from the left hand side. The piston first moves to the left without moving the extractor and consequently forces the tapered plug 66 into the extractor to expand it and force the teeth thereof into gripping engagement with the inner wall *d* of the cap, as illustrated in Fig. 5. Further movement of the piston in the same direction causes the movement of the extractor in the same direction, through its engagement with the plug 66, thus drawing the cap away from the end of the stationarily-held core. The core must now be removed from the holder. When the cap is free of the core, the air cock 50 is reversed to admit air to the under side of piston 32 and exhaust air from the upper side thus to raise the upper clamping block 28. The core is then removed by hand. The air cock 82 is now reversed to admit air to the left hand side of piston 70 and exhaust air from the right hand side thus to force the piston 70 to the right. The cross bar 60 is consequently moved to the right, due to the wedging of the plug 66 into the extractor 62 which is encased in the cap. When the head 80 makes contact with the cylinder head 13 the tube 78 comes to rest and holds the cross bar 60 at rest. Piston 70 continues to move to the right until it engages with the head 80. This additional motion of piston 70 forces the plug 66 partially out of the expander 56 allowing it to contract. The stripper plate 72 through the action of the springs 76 then forces the cap off the extractor.

The removed cap has the free edge *g* of the inner wall *d* outturned as illustrated in Fig. 3. Before the cap is replaced on the shortened, or some other, core the edge should be straightened or preferably reflexed inwardly, as in Fig. 8, in order to permit the cap to be applied to the core readily and without damage to the core. The machine described herein is adapted for this purpose. To this end the stripper-plate 72 is held against the yoke 58 by a plate 88 which is received over the extractor 56 and

overlies said stripper-plate and is attached detachably to said yoke by screws 90. Said plate also serves to hold said extractor against expansion and, to this end, has an aperture therein in which the extractor is located which is of such dimensions as to hold the extractor against expansion. The extractor thus functions as a holder or die for the cap, as shown in Fig. 6, the back wall *e* of the cap bearing against the plate 88. The extractor is provided with a tapered front face 92 so that the edge *g* of the cap is unsupported internally and is thus free to flex inwardly. A die 94 is provided which is adapted to be clamped in the core-clamping blocks 26 and 28 and has an internal annular face 96 which, when the cap is forced thereagainst by the movement of the cross-bar 60 under action of the piston 70, causes the edge *g* of the cap to be inturned as in Fig. 8, thus to re-condition the cap for application to the paper core.

We claim:

1. A machine for removing the metal caps from the ends of tubular paper cores, including a core clamp having a movable clamping block, fluid-operated means to hold said block against the core and also to move it away from the core, a cap extractor, a carrier therefor fluid operated means to move said carrier and the extractor toward and away from the cap on the end of the core in said clamp, and means operated by said fluid-operated means to force said extractor into pressure-applying relation with the cap.

2. A machine for removing the metal caps from the ends of tubular paper cores, including a core clamp having a movable clamping block, fluid-operated means to hold said block against the core and also to move it away from the core, a cap extractor, a carrier therefor, fluid-operated means to move said carrier to position the extractor within the cap, and means connected with said fluid operated means to force said extractor into gripping engagement with the cap and also to move said extractor away from said core.

3. A machine for removing the metal caps from the ends of tubular paper cores, including clamping means for the paper core, a cap extractor having provision for engaging the cap, a carrier for said extractor, fluid-operated means for moving said carrier and the extractor toward the cap and an extractor-expanding device connected with said fluid-operated means for holding said extractor in gripping engagement with the cap and for moving the expanded extractor away from the paper core.

4. A machine for removing the metal caps from the ends of tubular paper cores, including clamping means for the paper core, an expansible cap extractor movable toward and away from the clamped core, and fluid-operated means to operate said extractor having provision for first affecting the contraction of the extractor and then for moving the contracted extractor toward the clamped core, said fluid operated means including means to expand the extractor and to move the expanded extractor away from the clamped core.

5. A machine for removing the metal caps from the ends of tubular paper cores, including clamping means for the paper core, an expansible cap extractor movable toward and away from the clamped core, means controlling the expansion and contraction of said extractor, means for moving said extractor toward and also away from the clamped core, and means for operating the last two aforesaid means in the order named to effect the contraction of said extractor prior to the forward movement thereof and the movement of the expanded extractor away from the clamped core.

6. A machine for removing the metal caps from the ends of tubular paper cores, including clamping means for the paper core, an expansible cap extractor movable toward and away from the clamped core, means controlling the expansion and contraction of said expander, and a fluid-operated piston operating said controlling means having a lost-motion connection with said extractor for moving the contracted expander toward and the expanded extractor away from the clamped core.

7. A machine for removing the metal caps from the ends of tubular paper cores, including clamping means for the paper core, an expansible cap extractor movable toward and away from the clamped core, means for expanding said extractor arranged to draw the expanded extractor away from the core and having a member movable into engagement with said extractor for moving it toward the core.

8. A machine for removing the metal caps from the ends of tubular paper cores, including clamping means for the paper core, an expansible cap extractor movable toward and away from the clamped core, and fluid-actuated operating means for said extractor including a cylinder, a piston therein, a piston rod having an outer tapered member movably disposed within said extractor for expanding it, and means connected with said expander engageable with said piston during its forward movement for moving said expander toward the clamped core.

9. A machine for removing the metal caps from the ends of tubular paper cores, including clamping means for the paper core, an expansible cap extractor movable toward and away from the clamped core, and fluid-actuated operating means for said extractor including a cylinder, a piston therein, a piston rod having an outer tapered member movably disposed within said extractor for expanding it, a tube connected with said ex-

pander loosely surrounding said piston rod and entering said cylinder and disposed in position to be engaged by said piston after a short part of its forward movement, whereby to move the extractor forwardly.

10. A machine for pulling the metal caps from the ends of paper cores including clamping means for the core, a fluid-actuated piston movable toward and away from the clamped core having a front extractor-expanding part arranged to force the extractor into engagement with the cap, and a rear moving part arranged to move the extractor into operative position with the cap, and an expansible cap extractor alternately engageable with said parts.

11. A machine for pulling the metal cap from the ends of paper cores including a pair of guide rails, a core-clamp carried by and adjustable along said rails, a cylinder disposed between said rails in line with said core-clamp, a cap extractor slidable on said rails between and in line with said piston and core-clamp, a piston within said cylinder, and means operated by said piston for sliding said extractor forwardly and rearwardly along said rails and also for causing it to grip the cap of a clamped core.

12. A machine for pulling the metal caps from the ends of paper cores including a cylinder having cylinder heads, a pair of parallel guide rails carried by said cylinder heads and extended forwardly of said cylinder, a core-clamp carried by said rails in front of said cylinder, supporting means for said cylinder also comprising a support for said rails and core-clamp, a cap extractor slidable on said rails between said cylinder and core-clamp, and a piston within said cylinder having means for moving said extractor forwardly and rearwardly and also for holding it in gripping relation with the cap on a clamped core.

13. A machine for pulling the metal caps from the ends of paper cores including a pair of guide rails, a core-clamp at one end of said rails, a cylinder at the other end of said rails, an expansible cap extractor slidable on said rails between said cylinder and core-clamp, a piston operable within said cylinder, and means operated by said piston arranged to control the expansion and contraction of said extractor and also to move said extractor toward and away from said core-clamp.

14. A machine for pulling the metal caps from the ends of paper cores including a pair of guide rails, a core-clamp at one end of said rails, a cylinder at the other end of said rails, an expansible cap extractor slidable on said rails between said cylinder and core-clamp, a piston operable within said cylinder having a piston rod extended within said expander and provided with an enlarged tapered section for expanding said extractor, and a tube connected with said extractor loosely surrounding said piston rod and entering said piston and terminated therein in position to be engaged and moved forwardly by a part of said piston after a small forward movement thereof.

15. In a machine for pulling the caps from the ends of tubular paper cores, a cap extractor, fluid-operated means for operating said extractor, fluid-operated clamping means for the core, and means to govern the clamping pressure on the core, including adjustable spring-pressure means acting in opposition to said fluid-operated clamping means.

16. In a machine for pulling the caps from the ends of tubular paper cores, a cap extractor, fluid-operated means for operating said extractor, clamping means for the core including a clamping block, a spring arranged to move said block away from the core, and a hydraulic cylinder and piston to move said block against the core.

17. In a machine for pulling the caps from the ends of tubular paper cores, a cap extractor, fluid-operated means for operating said extractor, clamping means for the core including a carrier, a lower stationary clamping block carried by said carrier, an upper movable clamping block, a cylinder disposed above said movable clamping block having a support therefor connected with said carrier, a piston operable in said cylinder connected with said upper clamping block, a spring associated with said piston and acting to oppose the downward motion thereof, and means to vary the action of said spring.

18. A machine for pulling the caps from the ends of paper cores comprising a core-clamp, a cap extractor, fluid-operated means to force said extractor toward and away from said core-clamp, said extractor also constituting a support and carrier for a removed cap, and a die adapted to be clamped in said core-clamp into which said extractor is arranged to force a cap carried by it, to reshape the cap.

19. A machine for pulling the caps from the ends of paper cores comprising a core-clamp, an expansible cap-extractor, means to move said extractor toward and away from said core-clamp and also to expand said extractor, detachable means to hold said extractor against expansion, said extractor also constituting a support and carrier for a removed cap, and a die adapted to be clamped in said core-clamp into which said extractor is arranged to force a cap carried by it, to reshape the cap.

20. A machine for pulling the caps from the ends of paper cores comprising a core-clamp, a cylindrical expansible cap-extractor, a carrier therefor, means to move said extractor toward and away from said core-clamp and also to expand said extractor, a plate surrounding said extractor and having a detachable connection with said carrier arranged to hold said extractor collapsed

whereby to condition said extractor to support a removed cap, and a die adapted to be clamped in said core-clamp into which said extractor is arranged to force a cap carried by it, to reshape the cap.

21. A machine for pulling the caps from the ends of paper cores comprising a core-clamp, a cylindrical expansible cap-extractor, a carrier therefor, means to move said extractor toward and away from said core-clamp and also to expand said extractor, a stripper-plate surrounding said extractor and having a spring normally holding it forwardly of said carrier, a plate removably surrounding the rear portion of said extractor and holding said stripper plate against said carrier and said extractor in collapsed condition, whereby to condition said extractor to support a removed cap, and a die adapted to be clamped in said core-clamp into which said extractor is arranged to force a cap carried by it, to reshape the cap.

22. A machine for removing the metal caps from the ends of tubular paper cores including clamping means for the paper core, an expansible cap extractor movable toward and away from the clamped core, a fluid-operated member for expanding said extractor and also for moving it toward and away from the clamped core, and a stop-member for restricting the forward movement of said extractor, said fluid-operated member being free for a continued forward movement whereby to cause it to effect the contracting of said extractor.

In testimony whereof, we have signed our names to this specification.

MICHAEL J. MALLOY.
EVERETT A. BUCK.