United States Patent

[11] **3,633,335**

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[21] Appl. No. **854,151**
[22] Filed **Aug. 29, 1969**
[45] Patented **Jan. 11, 1972**
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[54] **ROLL END CAPPER**
8 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** **53/380**
[51] **Int. Cl.** **B65b 49/12**
[50] **Field of Search** ..... 53/196, 212, 214–216, 380; 93/39.1 R, 77 R

[56] **References Cited**

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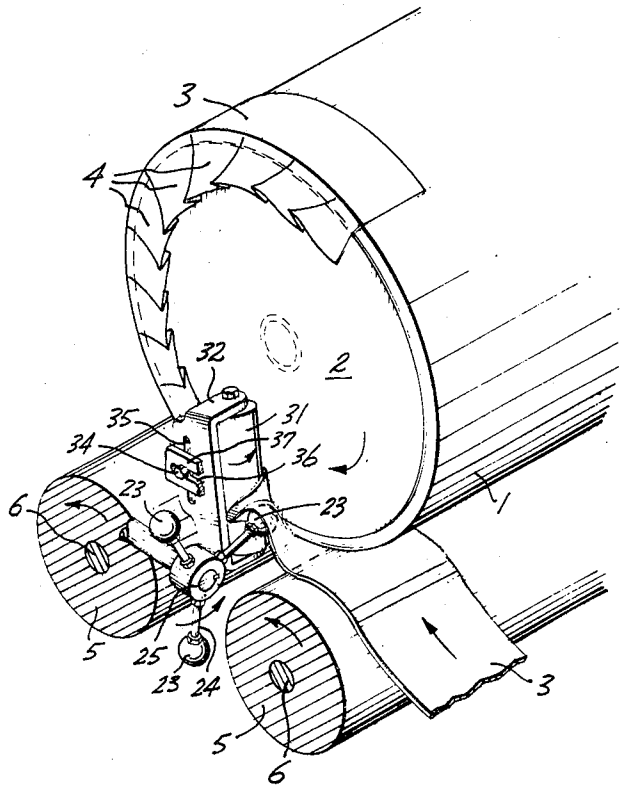
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Assistant Examiner—Robert L. Spruill
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ABSTRACT: A strip for securing a protective disk on a paper roll end has one edge portion encircling a roll margin. The other strip portion is folded inwardly over the disk margin and tucked during rotation of the paper roll, first, by flicking portions of the strip edge with circumferentially spaced balls of a whirling rotor and, then, by creasing the inwardly folded edge portions with a follower presser roller.



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SHEET 1 OF 2

Fig. 1.

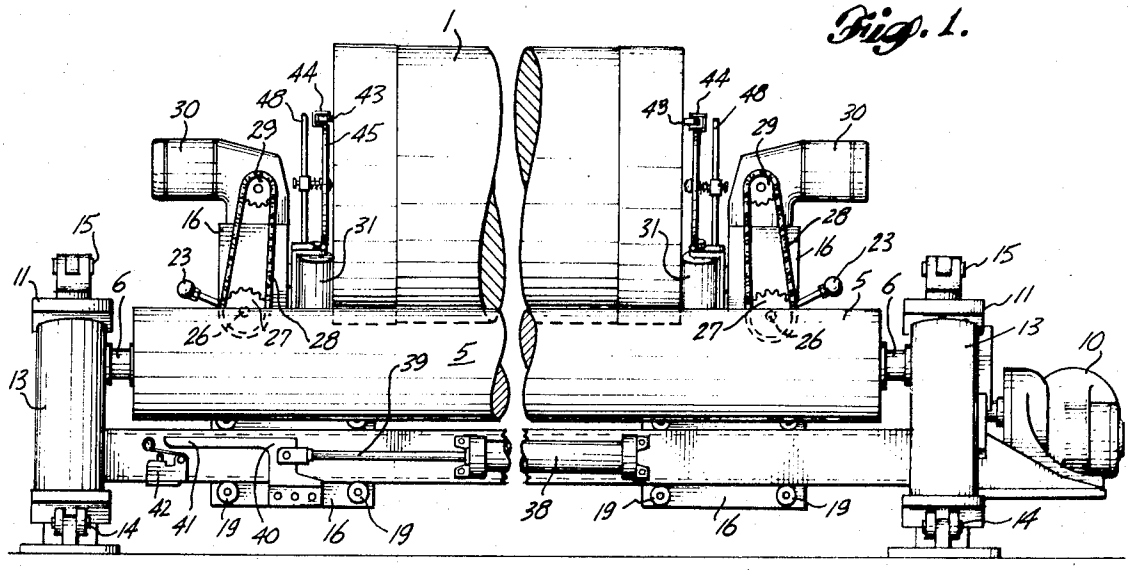


Fig. 2.

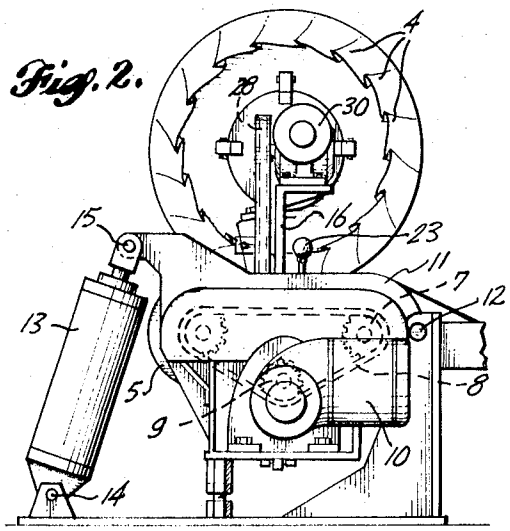
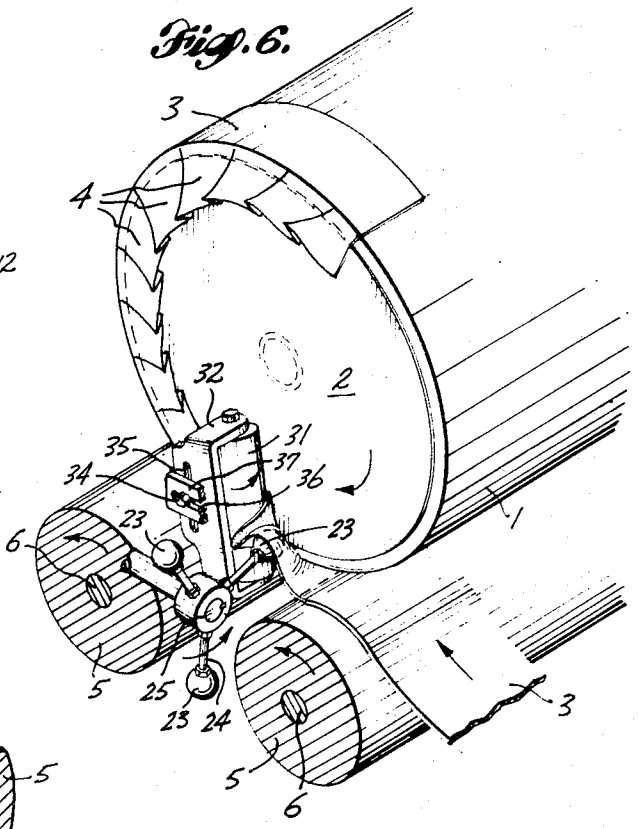


Fig. 6.



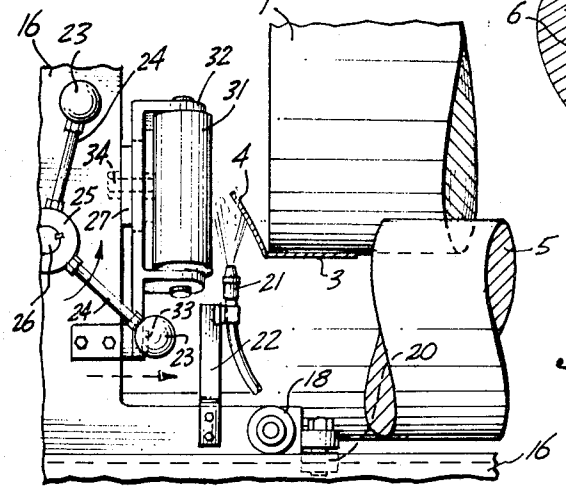


Fig. 5.

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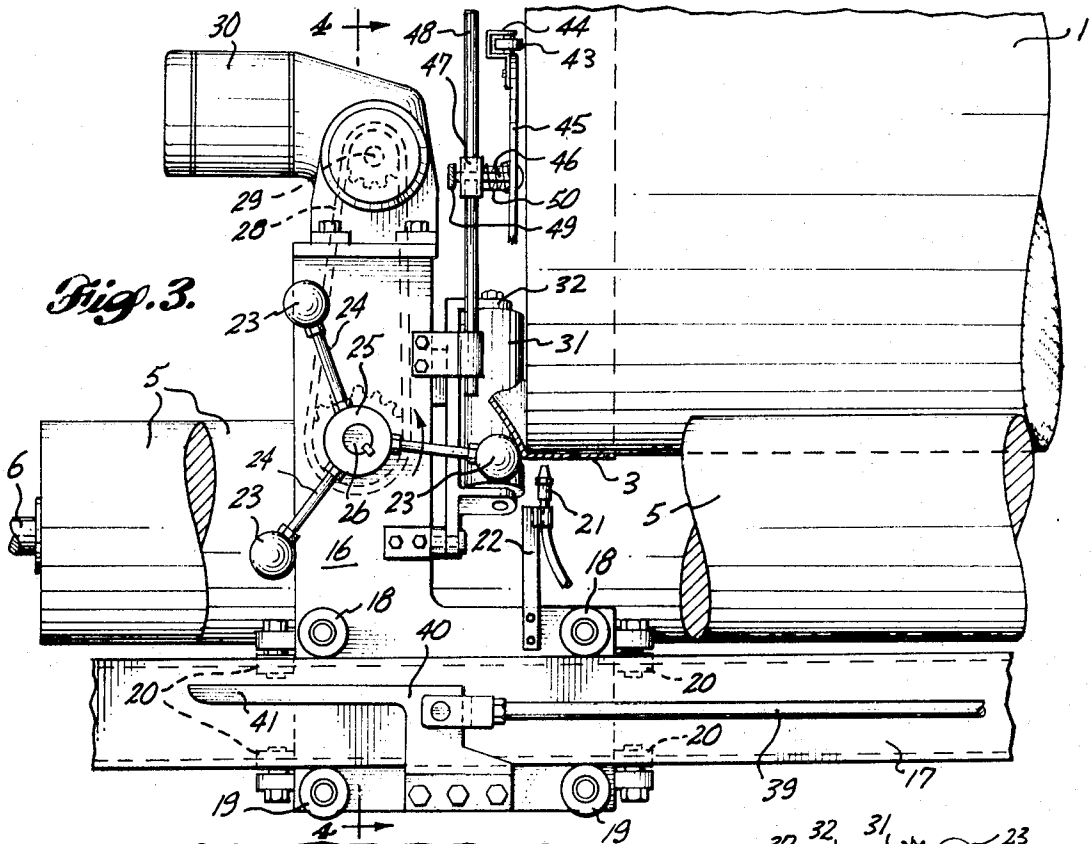


Fig. 3.

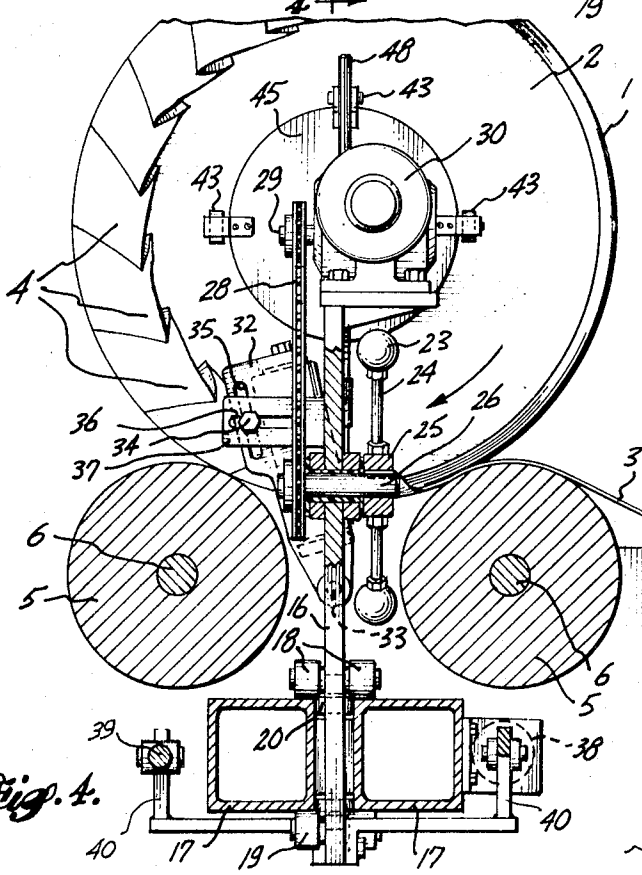


Fig. 4.

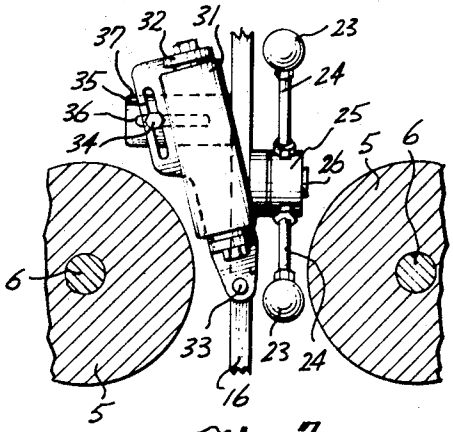


Fig. 7.

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ROLL END CAPPER

A principle object of this invention is to provide mechanism which can be used to cap opposite ends of a large roll or paper mechanically and which can be operated quickly. To expedite the capping procedure, opposite ends of the roll can be capped simultaneously.

Another object is to provide such mechanism which will apply a cap to a roll end that will cover such roll end completely and uniformly.

A further object is to provide such capping mechanism which can be used to cap rolls of different diameter with minimum adjustment.

FIG. 1 is a side elevation of the roll end capper having the central portion broken away and FIG. 2 is an end elevation of such mechanism.

FIG. 3 is a side elevation of one end portion of the roll end capper with parts broken away and FIG. 4 is a transverse section through the roll end capper taken on line 4—4 of FIG. 3. FIG. 5 is a fragmentary side elevation of a portion of the mechanism shown in FIG. 3 with parts shown in a different relationship.

FIG. 6 is a top perspective of one end portion of a paper roll being capped with portions of the mechanism broken away and FIG. 7 is an end elevation of that portion of the capping mechanism shown shown in FIG. 6.

In the process of its manufacture paper frequently is produced in large rolls which must be handled mechanically, such as by lift trucks, rather than manually. The ends of such rolls can be damaged easily during handling and shipping and it is desirable to protect such roll ends by capping them with a protective cardboard disk. To apply such a disk manually and hold it in place securely is time consuming. By use of the present mechanism such rolls can be capped quickly, securely and efficiently.

To each end of a roll **1** of paper is applied a protective covering disk **2** held in place by a collar formed by a strip having one edge portion **3** wrapped around the end portion of the roll periphery. The outer edge portion of such strip which overhangs the roll end is bent inwardly of the roll edge and folds **4** are formed and flattened to provide a circumferential tucked flange of the collar projecting radially inward into overlapping relationship with the margin of the protecting disk **2**. During the operation of applying such end caps to opposite ends of the roll **1**, such roll is supported by adjacent parallel rollers **5** carried by shafts **6** which are driven for rotation in the same direction by sprockets **7** connected by an endless chain **8**. This chain also extends around a drive sprocket **9** driven by a motor **10**.

Opposite ends of the shafts **6** are journaled in roller-supporting cradles **11**, each of which is swingable about a supporting pivot **12** by varying the effective length of a jack **13**. Each such jack has one end mounted by a pivot **14** and its opposite end connected to the swinging end of a roller-supporting cradle arm **11** by a pivot **15**. When the jack **13** is in its fully retracted condition the axes of the two roller shafts **16** will be in a substantially horizontal plane.

The tucker for each end cap-securing band is mounted on a post of a carriage **16**. Such carriage is supported and guided for movement along rails **17** disposed with their lengths parallel to the length of shafts **6** and located below and between such shafts as shown in FIG. 4. Such rails are spaced-apart to receive between them the plate of carriage **16**. Rollers **18** projecting from opposite sides of the carriage plate bear on the upper sides of the rails to support the carriage on them. Additional rollers **19** projecting from opposite sides of the carriage plate beneath the rails **17** are engageable with the undersides of such rails to restrain appreciable edgewise tilting of the plate post of the carriage. Appreciable sidewise tilting of such plate is prevented by rollers **20** mounted on opposite ends of the carriage being engaged between upper edge portions and lower edge portions of the rails **17**.

On the end portion of the carriage **16** adjacent to the roll **1** is mounted an air jet nozzle **21** on an upright **22**. As the carriage is moved along the rails **17** toward an end of roll **1** the air jet projected from such nozzle will deflect upward and inward the outer edge portion **4** of the cap-securing strip which overhangs the end of the roll **1**, as shown in FIG. **5**, to initiate the tucking operation. The outer edge portion of the strip thus deflected will be folded into circumferentially successive tucks as the roll **1** is revolved by rotation of its supporting rollers **5** in the directions indicated by the arrows in FIG. **6**.

The tucking mechanism includes a rotor having striker balls **23** mounted on the outer ends of radial arms **24** carried by a collar **25** secured on a shaft **26**. By rotation of this shaft in the direction indicated by the arrows in FIGS. **3** and **5**, the rotor is whirled and the arrows in FIGS. **3** and **5**, the rotor is whirled and the balls **23** flick successive circumferential portions of the outer band portion **4** to deflect such portions inward in initiating the tucking operation. Shaft **26** is rotated at a speed in synchronism with the speed of rotation of roll **1** so that the outer edge portion **4** of the cap-securing band will be tucked at the desired circumferential spacing. As shown in FIG. **1**, such rotation of shaft **26** is effected by sprocket **27** secured on the end of such shaft opposite rotor **25** and driven by endless chain **28** encircling the drive sprocket **29** turned by motor **30**.

As the paper roll **1** is turned beyond the rotor, the folds initiated by the striker are creased flat against the disk **2** overlying the roll end by a cylindrical follower roller **31**. Such roller is supported to rotate about an axis somewhat skewed from radial position as shown in FIGS. **6** and **7**, such roller being inclined to dispose its end which is closer to the axis of roller **1** in advance in the direction of roll **1** rotation of the end of the roller which is farther from the axis of roll **1**, so that the roller will engage first the portion of the fold closer to the roll periphery to press the fold flat. Such roller is journaled in a bracket **32** which is supported swingably relative to the carriage post **16** by a mounting pivot **33**.

The inclination of the axis of roller **31** relative to radial planes of the paper roll **1** intersecting such axis can be adjusted by swinging the bracket **32** about its pivot **33** to slide the anchoring bolt **34** along a slot **35** in such bracket having its length preferably extending parallel to the axis of roller **31** and an intersecting slot **36** in a roller support arm **37** extending transversely of the axis of roller **31**. As the inclination of the roller is increased the bolt **34** will slide along the slots **35** and **36** away from the upright plate of carriage **16** and away from the pivot **33**. When the axis of the roller has been adjusted to the desired angle of inclination, the bolt is tightened to secure the roller in that attitude.

When a paper roll **1** is placed on the supporting rolls **5** the tucker carriages **16** at opposite ends of the roll should be separated far enough to enable the roll to be inserted easily between the carriages. In applying the caps to the opposite ends of the roll the carriages will then the moved toward the respective roll ends. Shifting of the carriages along the rails **17** for this purpose is effected by fluid pressure jacks **38**. The cylinders of such jacks are mounted on the outer sides of the rails **17**, respectively, and the plungers **39** are secured to brackets **40** attached to the respective carriages **16**.

Movement of the carriages **16** toward the respectively adjacent ends of rollers **5** can be limited by engagement of a limit switch control arm **41** projecting from each bracket **40** engageable with a limit switch **42**. Such limit switch is arranged in an electric circuit to control the supply of fluid to the cylinder **38** of the corresponding jack for projecting its plunger **39**.

Rollers **43** at opposite ends of the roll **1** are engageable with the respective roll end protecting disks **2** to hold them in place against the roll ends during application of the disk-securing band **3**, **4**. Such rollers are mounted in yokes **44** to rotate about axes extending radially of the paper roll. Such yokes are carried by radial arms of a spider of mounting disk **45** as shown in FIGS. **1**, **3** and **4**. Such spider or disk is carried by a rod **46** shown in FIG. **3** projecting from a rod-supporting slide **47** which is slidably mounted on a post **48**. Such post is carried by the carriage **16** in the vertical diametral plane of the roll **1** as shown in FIG. **4**. The slide can be secured in any desired adjusted position along the post **48** by a set screw **49**.

In operation fluid under pressure, preferably hydraulic fluid, will be supplied to the jack cylinders 38 for projecting the plungers 39 to shift the tucker carriages 16 toward the adjacent ends of rolls 5 respectively until such carriages are stopped by engagement of the control arms 41 with their respective control switches 42. A paper roll 1 can then be hoisted or rolled onto the supporting rollers 5 to be cradled between them. Next, the ends of cap-securing strips 3 are drawn from strip supplies adjacent to opposite ends of the roll 1. Each strip passes over an adhesive-supplying or an adhesive-moistening roller and is fed between an end portion of the roll 1 and a roll-supporting roller 5 until its end is moved into registry with the whirling rotor.

A roll end protective disk 2 is then placed over each end of the roll 1 and fluid under pressure is supplied to the respective jack cylinders 38 to move the carriages 16 toward the opposite roll ends. During such movement the air jets from nozzles 21 will blow the overhanging edge portions 4 of the binding strips inward as shown in FIG. 5 during approach of the tucking mechanism to the roll ends. Movement of the carriages toward the roll ends will continue until the rollers 43 are engaged with the disks 2 to hold them in place on the roll ends.

The motors 30 will be driving the tucking rotors as the carriages are moved toward the roll ends as described without the rollers 5 being rotated. As the rotors engage the inwardly deflected portion of the strip 3, 4 such strip portion will simply be flicked successively by the whirling balls 23 until rotation of rollers 5 is started. The rollers 5 are then driven in synchronism in the same direction, such as in the direction of the arrows indicated in FIG. 6, so that the paper roll 1 will be rotated in the opposite direction. Because of the synchronization between the rotation of rollers 5 and the whirling of the striker balls 23, folds will be initiated by the tucker mechanism at locations equally spaced circumferentially at desired locations. The presser rolls 31 will then press the folds flat as shown in FIG. 6 during continued rotation of the paper roll. The adhesive will bind one edge portion 3 of each strip to its respective circumferential end portion of the roll 1 while such adhesive will secure the tucked portion of the strip to the roll end covering disk which will serve the dual function of holding the disk firmly in place and holding the tucked portion of the strip in its tucked condition.

After the end caps have thus been applied to opposite ends of the roll 1 the roll-supporting rollers 5 are stopped and fluid is supplied to the jack cylinders 38 for shifting the carriages 16 away from the roll ends. When the carriages have been shifted clear of the roll 1, fluid under pressure is supplied to the jacks 13 for swinging the entire cradle about pivots 15 to dump the roll 1 off the rollers 5. The jacks 13 can then be contracted again to place the axes of roller shafts 6 in a horizontal plane ready for another paper roll to be placed on the rollers 5.

On some papers it may be necessary to use a shoe instead of a roller to crease the folds of paper. It may also be advantageous to use a cam instead of the rotating balls.

I claim:

1. A roll end capper for folding over a roll end corner the portion of the width of a strip encircling an end portion of the roll circumference which overhangs such roll ends, comprising means for rotating the paper roll about an axis extending lengthwise of such roll in applying the strip around an end portion of the roller circumference with a portion of the width of such strip overhanging the roll end, and tucking means including a ball swung orbitally about an axis at a distance from the center of the ball much greater than the radius of the ball and extending transversely of the axis about which the paper roll is rotated to flick periodically only circumferentially spaced locations of an edge portion of the roll-encircling strip overhanging the roll end for deflecting such overhanging strip portion inward toward the adjacent roll end.

2. The capper defined in claim 1, in which the tucking means includes a plurality of balls whirled about an axis extending generally chordwise of the roll and spaced from the adjacent roll end.

3. The capper defined in claim 7, in which the ball-whirling means moves each ball toward the center of the roll as the ball approaches the roll end.

4. A roll end capper for securing a cap disk in position applied to the end of a paper roll by a cap-retaining strip encircling an end portion of the roll circumference and having a portion of its width folded over the roll end corner and the margin of the cap disk, comprising means for rotating the paper roll in applying the cap-retaining strip around an end portion of the roll circumference with a portion of the width of such strip overhanging the roll end, tucking means for deflecting inward and folding at circumferentially spaced locations the portion of the strip width overhanging the roll end to engage the folded strip portions with the margin of the cap disk applied to the adjacent roll end, and cap-disk-holding means engageable with the cap disk for holding such disk against the roll end prior to the cap-retaining strip engaging the disk margin.

5. The capper defined in claim 4, in which the cap-disk-holding means includes a plurality of rollers rotating about axes extending radially of the roll and engaging the cap disk.

6. A roll end capper for folding over a roll end corner the portion of the width of a strip encircling an end portion of the roll circumference which overhangs such roll end, comprising means for rotating the paper roll in applying the strip around an end portion of the paper roll circumference with a portion of the width of such strip overhanging the roll end, tucking means for deflecting inward and folding at circumferentially spaced locations the portion of the strip overhanging the roll end, and presser means including a pressure roller cooperating with said tucking means and pressed against the paper roll end during strip-deflecting operation of said tucking means and engageable with the portions of the strip width folded by said tucking means for creasing the strip folds and means supporting said pressure roller for rotation about an axis somewhat skewed from a radial plane of the paper roll which intersects the axis of said roller.

7. The capper defined in claim 6, in which the roller-supporting means supports the pressure roller inclined to dispose its end which is closer to the axis of the paper roll in advance in the direction of paper roll rotation of the end of the roller which is farther from the axis of the paper roll, whereby a portion of a strip fold nearer the circumference of the paper roll is pressed by the pressure roller before the portions of the fold farther from the paper roll circumference are pressed by the pressure roller.

8. A roll end capper for folding over a roll end corner the portion of the width of a strip encircling an end portion of the roll circumference which overhangs such roll end, comprising means for rotating the paper roll in applying the strip around an end portion of the roll circumference with a portion of the width of such strip overhanging the roll end, tucking means for deflecting inward and folding at circumferentially spaced locations the portion of the strip width overhanging the roll end, and nozzle means adjacent to the tucking means for projecting a stream of fluid against the portion of the strip width overhanging the end of the roll prior to engagement of the tucking means therewith to initiate inward deflection of such overhanging portion of the strip width.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,633,335 Dated January 11, 1972

Inventor(s) Meder Johnson

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, line 59, change "ends" to --end--.

Column 4, line 8, cancel "7" and insert --2--.

Signed and sealed this 13th day of June 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents