Oct. 12, 1971 P. S. CUSHING ET AL 3,611,552

COLD DRAWING A DISK INTO A CAP FOR PAPER CORE

Filed March 9, 1970 2 Sheets-Sheet 1

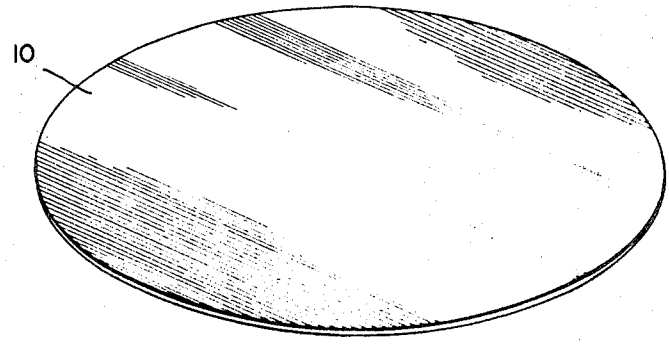


FIG. 1

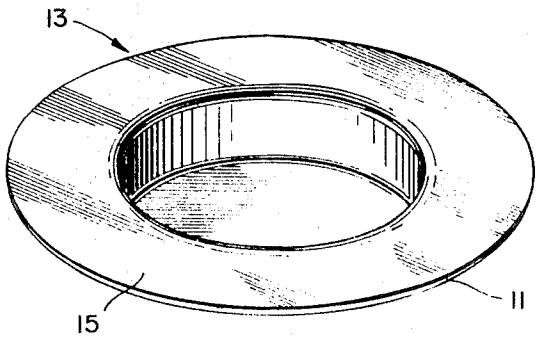


FIG. 2

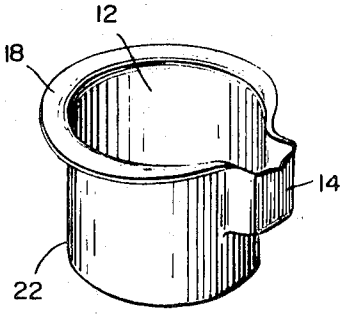


FIG. 4

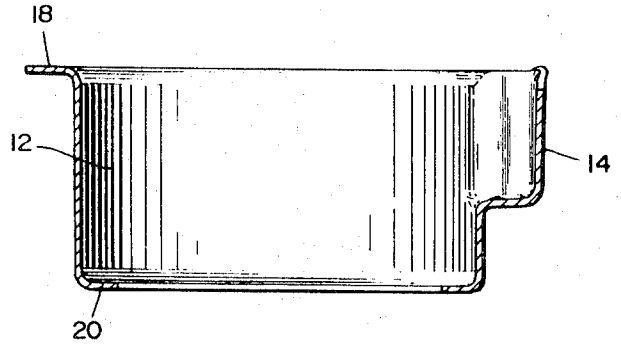


FIG. 3

INVENTOR
PHILIP S. CUSHING
HARRIS E. STONE
Morse, Altman & Dates
ATTORNEY

Oct. 12, 1971 P. S. CUSHING ET AL 3,611,552

COLD DRAWING A DISK INTO A CAP FOR PAPER CORE

Filed March 9, 1970 2 Sheets-Sheet 2

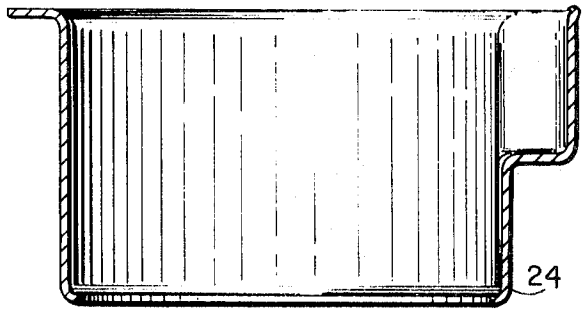


FIG. 5

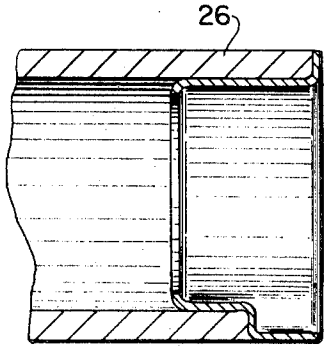


FIG. 6

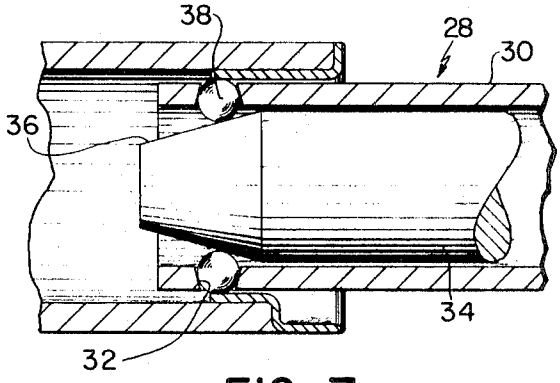


FIG. 7

INVENTOR
PHILIP S. CUSHING
HARRIS E. STONE

BY Morse, Altman & Oates

ATTORNEYS

United States Patent Office 3,611,552 Patented Oct. 12, 1971

3,611,552
COLD DRAWING A DISK INTO A CAP FOR PAPER CORE

Philip S. Cushing and Harris E. Stone, both of 293 Lenox St., Norwood, Mass. 02068

Continuation-in-part of abandoned application Ser. No. 746,154, July 19, 1968. This application Mar. 9, 1970, Ser. No. 17,638

Int. Cl. B21d *39/04*

U.S. Cl. 29—523 1 Claim

ABSTRACT OF THE DISCLOSURE

A metal cap for a paper core is made by three operations:

(1) Depressing the central area of a steel disk to form a shallow cup;

(2) Deepening the cup and simultaneously forming a socket in the wall of the cup;

(3) Cutting out the central portion of the bottom of the cup to leave an inward bottom flange and straightening the flange to add to the length of the cylindrical wall of the object. A slight radius is maintained around the end to permit insertion in a core where it is subsequently expanded.

CROSS-REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of U.S. application Ser. No. 746,154 filed July 19, 1968, now abandoned, by Philip S. Cushing et al. and entitled "Cold Drawing a Disk Into a Cap for Paper Core."

This invention relates to metal caps for paper cores such as are used for rolls of newsprint and other kinds of paper. The cap hereinafter described is an improvement over that described and illustrated in our U.S. Pat. No. 3,291,413, granted Dec. 13, 1966, for Cap for Paper Core. A method of making the latter is claimed in our copending application Ser. No. 572,362, filed Aug. 15, 1966, now U.S. Pat. No. 3,449,817.

According to the present invention, a steel disk is cold drawn into a cup with cylindrical sidewalls and a socket on one side, the central portion of the bottom of the cup is cut or punched out, leaving an inward flange. This flange is substantially straightened out to form a continuation of the cylindrical wall, the final form being a cylindrical tube with a top flange of varying width, a socket projecting radially from the upper portion of the cylindrical wall and a slight bead or radius around the end to facilitate insertion in a core when it is subsequently straightened.

The successive stages by which the cap is formed, mounted and finished are illustrated on the drawing, of which

FIG. 1 is a perspective view of a circular disk of sheet metal;

FIG. 2 is a perspective view of a shallow cup formed by cold drawing the disk shown in FIG. 1;

FIG. 3 is a sectional view of a deeper cup formed from the shallow cup by a cold drawing step, followed by the removal of the central area of the bottom of the cup;

FIG. 4 is a perspective view, on a reduced scale, of the finished cap;

FIG. 5 is a sectional side view of the finished cap,

FIG. 6 is a sectional side view of the cap mounted in a core; and,

FIG. 7 is a view similar to FIG. 6 showing the final shaping step.

In the following description of a method of making a cap, dimensions are given by way of illustration and not limitation for a cap to fit in an end of a standard paper core having a three-inch inner diameter.

The starting piece is a circular steel disk **10** which is 5½ inches in diameter. This is subjected first to a cold drawing step by which the central portion **11** of the disk, having a diameter of 3", is depressed about ⅝", reducing the diameter of the disk to about 4⅞". The resulting step product **13**, illustrated in FIG. 2, which is in the form of a shallow saucer with a plane rim **15** about ⅞" wide, is subjected to a second drawing operation to deepen the central depression to a depth of 1⅜", forming a cylindrical cup **12** with a narrower rim. By this second operation also a socket **14** is pressed outward, some of the metal for this socket being drawn from adjacent portions of the rim **15** so that the rim **18** varies from zero extent on either side of the socket to a maximum diametrically opposite to the socket.

In the final drawing operation the central area of the bottom of the cup **12** is cut or punched out and the resulting inward flange **20** is straightened so that it becomes an extension **22** of the cylindrical wall of the cap which, as indicated in FIG. 4, is tubular with a top flange **18** of varying width, and a laterally projecting socket **14**. The added length of the cap provides desirable stability when the cap is inserted in an end of a paper core.

As shown best in FIG. 5 the lower or inner edge of the cup is left with a slight bead or radius **24** which facilitates insertion of the cup into the end of a core **26** as shown in FIG. 7. Once seated in position, the bead **24** is smoothed out flush against the inner walls of the core by any one of a variety of devices such as an expandable chuck or the like. In FIG. 8 there is shown a rolling mechanism **28** which may be used for this purpose. The mechanism includes a rotatable tubular outer sleeve **30** formed with tapered openings **32** in a circle about its leading end, a central shaft **34** formed with a tapered end portion **36** and a plurality of hardened balls **38** trapped between the openings **32** and the portion **36**. Rotation of the sleeve **30** together with an axial force applied to the shaft will cause the balls **38** to roll down the bead **24** until it is flush against the core walls.

We claim:

1. A method of making a cap for a paper core having a notch in an end of said core, which comprises

(a) cold drawing a circular disk of sheet metal to form a shallow cup with cylindrical side walls and a wide plane rim,

(b) performing a second cold drawing operation on said cup to deepen said cylindrical cup and simultaneously to press a socket outward at the top of the cup, the metal for the socket being drawn from portions of said rim adjacent thereto whereby said plane rim is narrowed to vary from zero extent at said socket to a maximum diametrically opposite said socket, said socket being adapted to be assembled within said notch,

(c) removing the central area of the bottom of said cup to leave an inward flange,

(d) straightening said inward flange to form a cylindrical extension of the side walls of the cup and a bead about the end thereof,

(e) mounting said cap in said core, and,

(f) flattening said bead against said core.

References Cited

UNITED STATES PATENTS

3,449,817	6/1969	Cushing et al.	29—416
3,512,240	5/1970	Robinson	29—523

RICHARD J. HERBST, Primary Examiner

U.S. Cl. X.R.

72—348