

July 14, 1931.

W. H. CARSON

1,814,546

MACHINE FOR FORMING HEMISPHERICAL CAPS WITH SEALING LIPS

Filed March 21, 1929

2 Sheets-Sheet 1

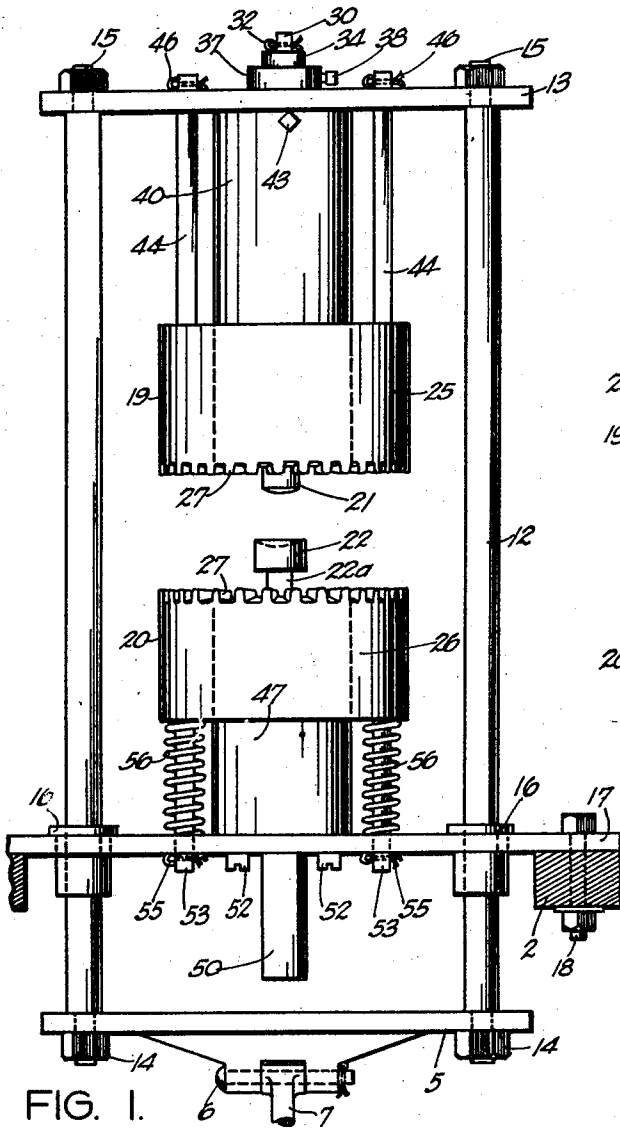


FIG. 1.

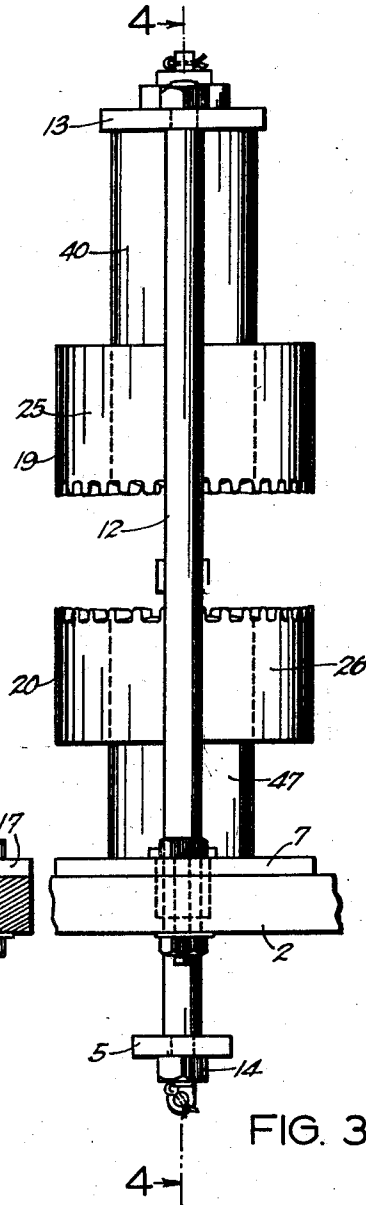


FIG. 3.

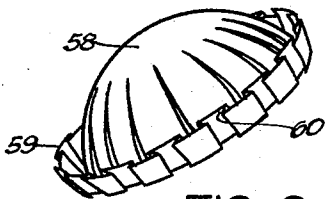


FIG. 2.

William H. Carson INVENTOR
BY *Loyal J. Miller* ATTORNEY

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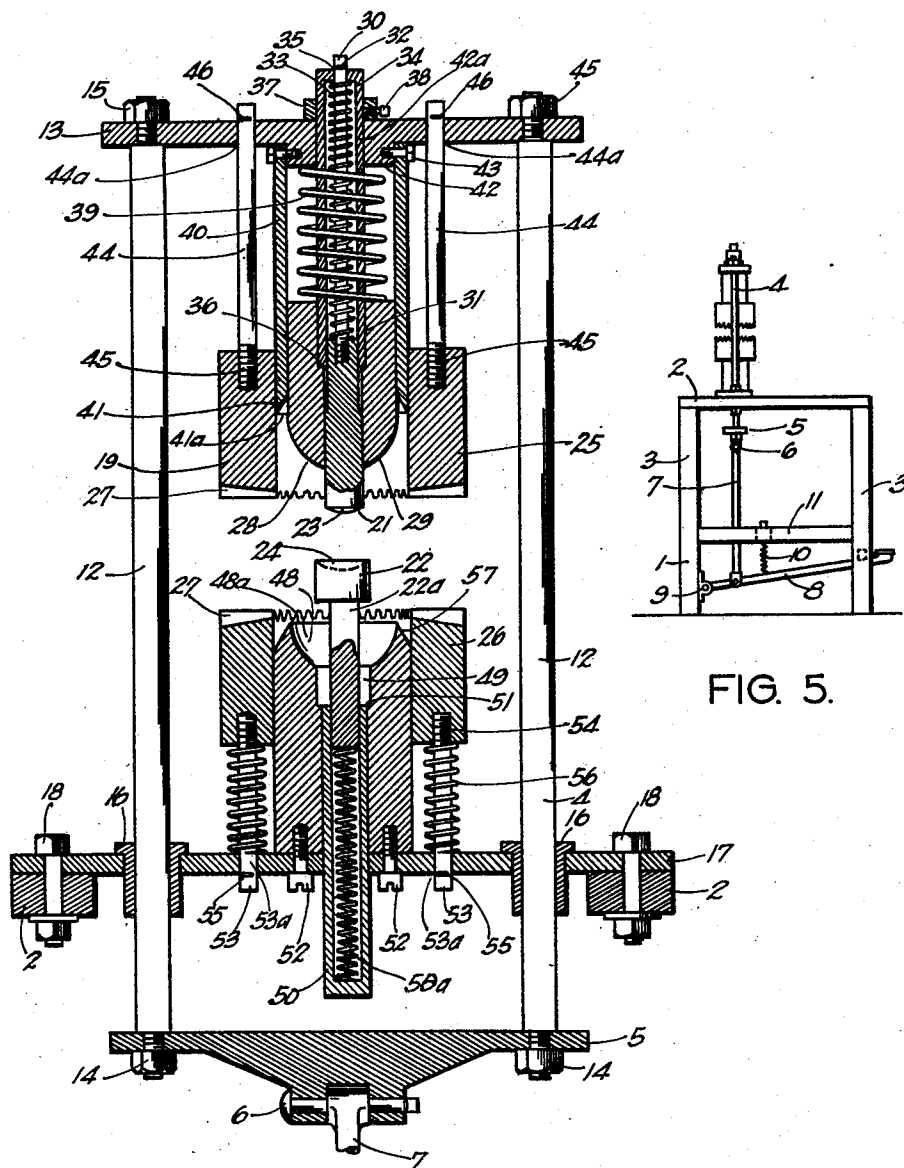


FIG. 4.

FIG. 5.

William H. Carson INVENTOR

BY *Loyall Miller*
ATTORNEY

UNITED STATES PATENT OFFICE

WILLIAM H. CARSON, OF NORMAN, OKLAHOMA

MACHINE FOR FORMING HEMISPHERICAL CAPS WITH SEALING LIPS

Application filed March 21, 1929. Serial No. 348,893.

This invention relates to improvements in machines of the type mentioned particularly adapted to form hemispherical paper caps with upturned lips suited to be used in hermetically sealing packages when filled.

The objects of the invention are to provide a machine, either power driven or hand and foot operated, for forming hemispherical caps from discs of paper; having an upturned edge or lip on each cap adapted to be used in sealing the cap in hermetical contact with a package; which will be new, novel, efficient and of utility, cheaply and easily manufactured and operated; to provide a machine which at the beginning of operation, first grips the paper disc, then forms the hemisphere and finally turns up the sealing lip all in one successive operation; and in which the gripping members serve as ejectors for the finished caps when the machine is opened.

With these and other objects in view, the invention consists in the construction and novel combination of parts hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the claims hereto appended, it being understood that various changes in the form, proportion, size and minor details of construction, within the scope of the claims, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Other and further objects and improved results of my invention will appear in the following specification, appended claims, and the accompanying drawings in which Figure 1 is a front elevational view of the cap forming machine; Fig. 2 is a perspective view of a finished cap, partly opened; Fig. 3 is a side elevational view of the cap forming machine; Fig. 4 is a sectional elevation of the machine on the line 4-4 of Fig. 3; Fig. 5 is an assembled view of the cap forming machine showing the stand upon which it is mounted and the foot operating means.

The operating parts of the machine in its preferred form may be mounted upon

any suitable frame or stand 1 including a platform or table 2 supported by the legs 3.

Like characters of reference designate like parts in all the figures.

The reciprocating frame 4, which in the present embodiment is vertical having a bottom cross bar 5, provided with a hinge and pin 6, is connected with a treadle 8 by a connecting rod 7. The treadle is provided with a hinge 9 and a retrieving spring 10 connected to a cross member 11 of the stand 1. The reciprocating frame 4 is provided with side frame rods 12 slidably mounted in bushings 16 supported by the base plate 17. The said rods 12 are rigidly secured to the bottom cross bar 5 by the nuts 14, and are rigidly fastened to the top cross plate 13 by the nuts 15. The said supporting base plate 17 is secured to the table 2 by the anchor bolts 18.

Attached to and supported by the top cross plate 13 is the upper die 19. The lower die 20 is attached to and supported by the base plate 17. The upper centering pin 21 is in perfect alignment with the lower centering pin 22. The said pin 21 is provided with a spherical shaped point 23 which is adapted to form a complete hemispherical pointed plunger 28 when the said pin 21 is pushed upward until the shoulder 29 formed by the reduced section strikes and is stopped by the lower end of the upper center-supporting sleeve 34. The enlarged upper end of the lower centering pin 22 forms a shoulder stop at its junction with the reduced section 22a. The said enlarged end of 22 is provided with a spherical cavity 24 adapted to form and complete the hemispherical cup 48 of the member 47 when the said pin 22 is lowered until it occupies the recess 49 in the said member 47.

The upper fluting member 25 and the lower fluting member 26 are provided with rounded inwardly tapering mitre gear-like teeth 27 adapted to loosely intermesh when the paper disc is placed between them and the said fluting members 25 and 26 are brought into contact by means of the foot-treadle 8 and the reciprocating frame 4. The upper centering pin 21 with its reduced

section and stop shoulder 29 is provided with a guide rod 30 in threaded connection with the said pin 21 at 31. The said guide rod 30 is secured against downward movement by the cotter key 32 resting upon the upper end of the upper center supporting sleeve 34. The said upper centering pin 21 is under the influence of the small, light, helical compression spring 33 mounted upon the guide rod 30, the said rod 30 having limited reciprocation through the hole 35 in the sleeve 34. The upper centering pin 21 is slidably mounted and has movement in both the hemispherical pointed plunger 28 and the lower end of the sleeve 34 until the shoulder 29 on pin 21 strikes the stop formed by the end of the said sleeve 34, in which position the point 23 of the pin 21 forms a part of and completes the hemispherical surface of the plunger 28. The said plunger 28 is mounted rigidly by forced fit to the sleeve 34 and is under the influence of the large heavy spring 39, and the said plunger 28 has limited motion within the hollow, knife-edged, lip-forming cylinder 40. The said cylinder 40 is attached to the cylindrical extension 42 on the underside of the top cross plate 13 by the cap screws 43. The upper center supporting sleeve 34 serves as a guide for the plunger 28 and has in the present embodiment vertical motion in the hole 42a through the plate 13 and its downward extension 42. The collar 37 attached to the sleeve 34 by the set screw 38 forms a stop to the downward travel of the plunger 28. The upper fluting member 25 is supported and guided by the rods 44 threaded to the said member 25 at 45 and slidably mounted in holes 44a in cross plate 13. The cotter keys 46 form stops for the member 25 in its downward travel. The said member 25 is positioned on the outside of the hollow lip forming cylinder 40 and slides up and down on the said cylinder 40. The said member 25 is so designed that it performs its function by virtue of its weight and requires no springs.

The lower centering pin 22 is under the influence of the small helical supporting spring 50a enclosed within the lower center sleeve 50 within which the reduced section 22a of the said pin 22 has a limited movement. When force is applied to the pin 22 it finally fills the recess 49 in the lower die block 47 and comes to rest against the stop shoulder 51 on the member 47 and the upper end of the sleeve 50. In this position the cavity 24 in the enlarged end of pin 22 forms a part of and completes the hemispherical cup in the die block 47. The said die block 47 is rigidly secured to the supporting base plate 17 by the cap screws 52. The lower fluting member 26 is slidably mounted as shown in the present embodiment for vertical reciprocation on the said member 47, is held in

proper alignment and guided by the rod 53 in threaded connection 54 with said member 47 mounted in holes 53a through plate 17 and is under the supporting influence of the intermediate compression springs 56. The member 26 is held in proper subjection by the cotter keys 55 through the lower ends of rods 53 and on the underside of the base plate 17.

In the operation of the machine, a paper disc is placed between the upper die 19 and the lower die 20. The frame 4 is caused to descend by means of the treadle 8 and its connections until the said paper disc is gripped gently between the two centering pins 21 and 22. The light springs 33 and 50a interpose only slight resistance to the recession of the said pins 21 and 22 into their respective sleeves 34 and 50. On the further descent of the die 19, the members 25 and 26 begin to crimp the paper into flutes which permits the forming of the hemisphere 58 between the plunger 28 and the cup 45. Moving the die 19 still further down, the knife edge 41 and its inwardly tapering incline 41a on member 40 turns the edge of the now formed hemispherical cap over the knife edge 48a around the cup 48 and down on the outwardly tapering incline 57 on the die block 47, this forming the sealing lip 59 having a zig-zag edge 60 when flattened out as in Fig. 2. When the foot treadle 8 is released the retrieving spring 10 raises the die 19, the centering pins act as ejectors in removing the finished cap with its up-turned sealing lip and the machine is ready for another succession of operations. The size and tension of the various springs are so regulated as to perform the functions of the various parts of the machine automatically, with sufficient force to produce a perfect hemispherical cap but at the same time not tear the paper.

In Fig. 2 I have shown in perspective a finished cap, partly opened, the primary purpose of which is for hermetically sealing a top to a cone shaped package containing pop-corn confection or substance of a like or other nature. The specification and claims for the machine for forming such contents is fully set forth in my pending application, Serial Number 208,322, filed July 25, 1927.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent, is:

1. Apparatus for the purposes described embodying a horizontal rigid base, a frame having an upper and a lower cross-plate and having side guide rods rigidly connecting said plates, said rods slidably mounted through said base, removable bearings for said rods, a centrally bored fluting die having upper peripheral teeth mounted upon said base between said rods, a slightly short-

er female die mounted upon said base and within the bore of said fluting die, said female die having a hemispherical cavity in its upper end and having an annular beveled flange forming portion surrounding said cavity, a downstanding centrally bored fluting die supported by said upper plate in vertical alinement with said first mentioned fluting die, a male die within the bore of said downstanding fluting die, said male die having a hemispherical convex lower end, a beveled ended flange forming die surrounding said male die, means connected to said lower plate for vertically reciprocating said frame, and means carried by said male and said female dies for holding a blank of fibrous material between the dies supported by said base and the dies carried by said upper plate, said dies adapted to form a fluted hemispherical cap with an annular outstanding flange upon each complete reciprocal motion of said frame.

2. Apparatus for the purposes described having in combination a horizontal rigid base, a frame having an upper and a lower cross-plate and having side guide rods rigidly connecting said plates, said rods slidably mounted through said base, removable bearings for said rods, a centrally bored fluting die having upper peripheral teeth mounted upon said base between said rods, a slightly shorter female die mounted upon said base and within the bore of said fluting die, said female die having a hemispherical cavity in its upper end and having an annular beveled flange forming portion surrounding said cavity, a downstanding centrally bored fluting die supported by said upper plate in vertical alinement with said first mentioned fluting die and adapted to co-act therewith, a male die within the bore of said downstanding fluting die, said male die having a hemispherical convex lower end, an annular beveled ended flange forming die surrounding said male die, means connected to said lower plate for vertically reciprocating said frame, and means carried by said male and said female dies for holding a blank of fibrous material between the dies supported by said base and the dies carried by said upper plate, said dies adapted to form a fluted hemispherical cap with an annular outstanding flange upon each complete reciprocal motion of said frame.

3. Apparatus for the purposes described having in combination a horizontal rigid base, a frame having an upper and a lower cross-plate and having side guide rods rigidly connecting said plates, said rods slidably mounted through said base, removable bearings for said rods, a centrally bored fluting die having upper peripheral teeth mounted resiliently upon said base between said rods, a slightly shorter female die mounted rigidly upon said base and with-

in the bore of said fluting die, said female die having a hemispherical cavity in its upper end and having an annular beveled flange forming portion surrounding said cavity, a downstanding centrally bored fluting die supported by said upper plate in vertical alinement with said first mentioned fluting die and adapted to coact therewith, a male die within the bore of said downstanding fluting die and adapted to move independently of said last named die, said male die having a hemispherical convex lower end, an annular beveled ended flange forming die surrounding said male die and rigidly mounted upon and downstanding from said upper plate, means connected to said lower plate for vertically reciprocating said frame, and means carried by said male and said female dies for holding a blank of fibrous material between the dies supported by said base and the dies carried by said upper plate, said dies adapted to form a fluted hemispherical cap with an annular outstanding flange upon each complete reciprocal motion of said frame.

4. An apparatus for forming fibre caps for vessels having in combination, a mold having a smooth walled recess of a configuration corresponding substantially to the shape of the article to be formed, said mold rigidly mounted vertically upon a base, a plug having a smooth outer surface adapted to co-operate with the mold to compress a pleated fibre article between the smooth surfaces of the mold and plug respectively, a centrally apertured die resiliently mounted upon said base and surrounding the upper portion of and normally extending above said mold and adapted to permit the free and unobstructed passage therethrough of the plug, said die having irregularities upon its upper end for assisting in forming undulations in said article, a reciprocating device supporting said plug, a second centrally apertured die carried by said reciprocating device, said second die surrounding said plug and normally extending below the lower end of said plug, and having irregularities upon its lower end adapted to co-act with the first mentioned die in undulating the portion of said article which lies adjacent to the open mouth of said mold, means for supporting a fibre sheet between the dies, means for causing the reciprocating device to carry said second die toward said first mentioned die and to undulate said article, means to arrest further motion of said second mentioned die, means to cause the plug thereupon to advance into the mold and thereby draw the fibre sheet from contact with the teeth on said dies, and then as the plug completes its advance into the mold, causing the pleats to be compressed and permanently creased, means for causing the

plug and reciprocating device to be withdrawn sufficiently far to permit the ready removal of the compressed pleated vessel from the apparatus, said sheet supporting means acting as a follower for automatically carrying the pleated cap out of the mold as the plug recedes and to support it in a free position above the mouth of the mold whence it may be manually removed freely in a lateral direction.

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5. Organization as described in claim 4, in which said sheet supporting means comprises a first plunger rod resiliently supported vertically within said plug and normally extending below the lower end of the plug, said plunger adapted to be compressed within said plug, and when so compressed adapted to form a continuation of the end periphery of the plug, and further comprises a second plunger rod resiliently supported within said mold and normally extending thereabove, said second rod having a recess in its upper end adapted to form a continuation of the bottom of the recess in said mold when the second rod is compressed within said mold, said rods when in an adjacent position adapted to support said sheet therebetween.

WILLIAM H. CARSON.