Sept. 25, 1923. 1,468,724

V. MAUCK

CAN FORMING MECHANISM

Filed April 14, 1921. 3 Sheets-Sheet 1

FIG. I.

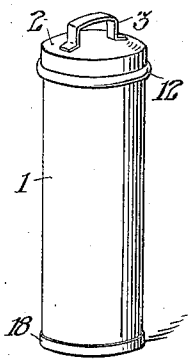


FIG. II.

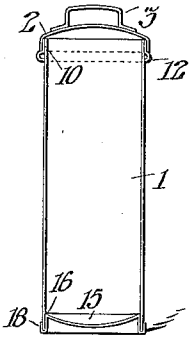


FIG. III.

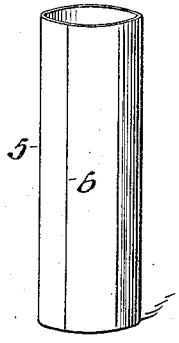


FIG. IV.

FIG. V.

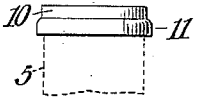


FIG. VI.

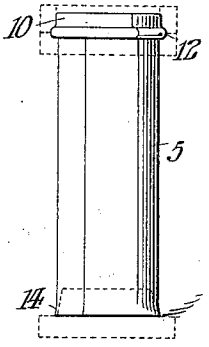


FIG. VII.

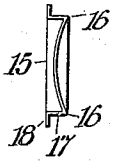


FIG. VIII.

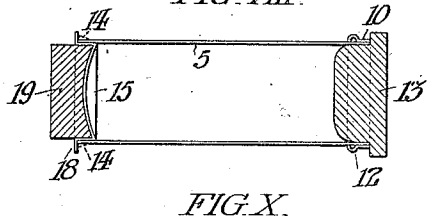


FIG. IX.

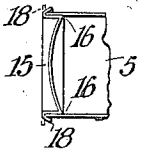
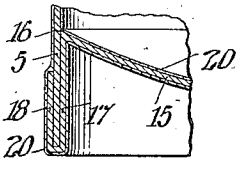


FIG. X.



INVENTOR:
VICTOR MAUCK,
by Arthur E. Baiggs,
Attorney.

Sept. 25, 1923. 1,468,724

V. MAUCK

CAN FORMING MECHANISM

Filed April 14, 1921 3 Sheets-Sheet 2

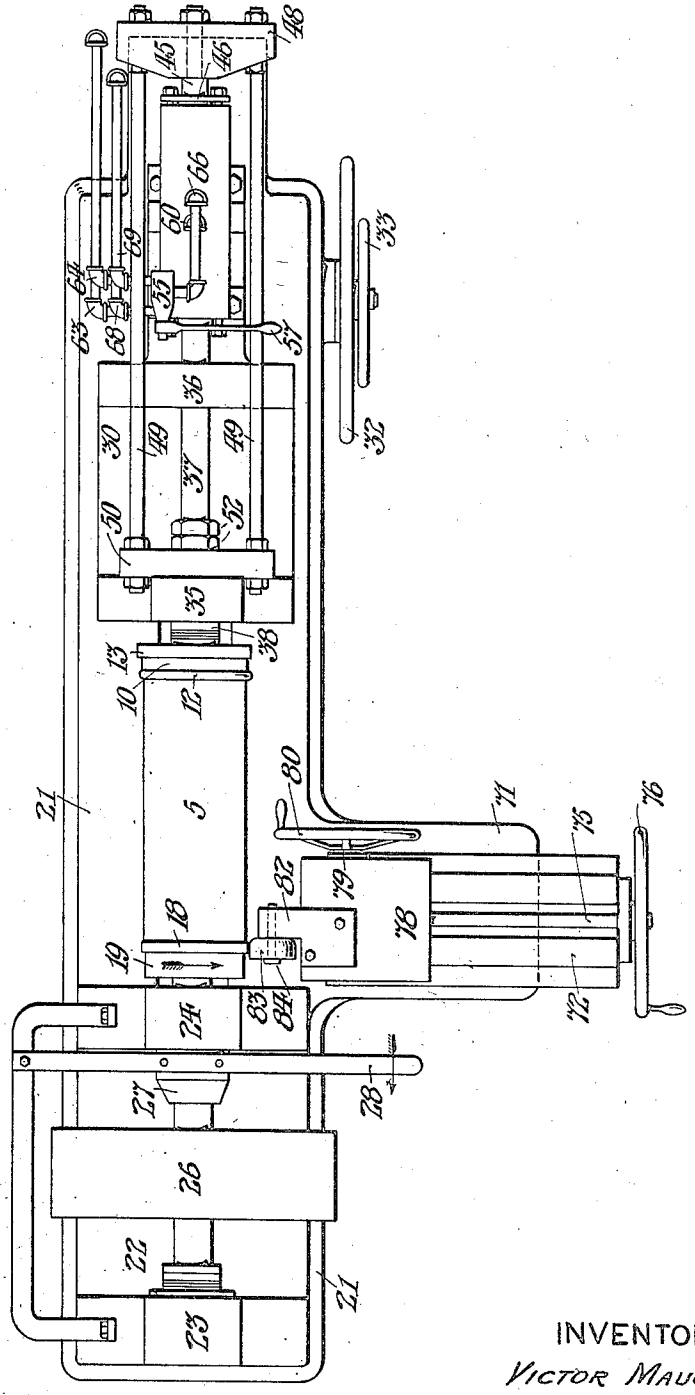


FIG. XI.

INVENTOR:
VICTOR MAUCK,
by William E. Paige,
Attorney.

Sept. 25, 1923. 1,468,724

V. MAUCK

CAN FORMING MECHANISM

Filed April 14, 1921 3 Sheets-Sheet 3

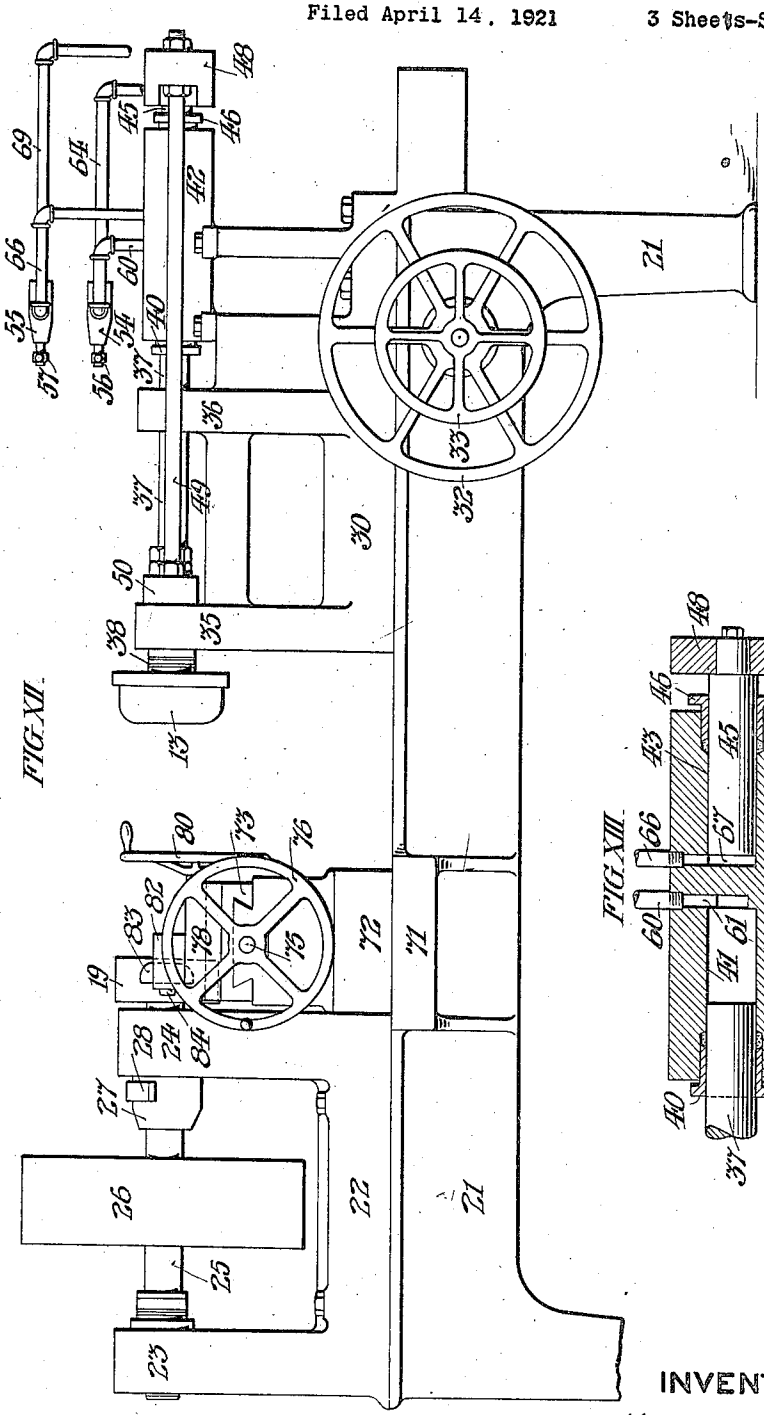


FIG. XII.

FIG. XIII.

INVENTOR:

VICTOR MAUCK,

by Arthur E. Paige

Attorney.

Patented Sept. 25, 1923. 1,468,724

UNITED STATES PATENT OFFICE.

VICTOR MAUCK, OF NORRISTOWN, PENNSYLVANIA, ASSIGNOR TO JOHN WOOD MANUFACTURING COMPANY, OF CONSHOHOCKEN, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

CAN-FORMING MECHANISM.

Application filed April 14, 1921. Serial No. 461,274.

To all whom it may concern:

Be it known that I, VICTOR MAUCK, a citizen of the United States, residing at Norristown, in the county of Montgomery and State of Pennsylvania, have invented a certain new and useful Improvement in Can-Forming Mechanism, whereof the following is a specification, reference being had to the accompanying drawings.

My invention is especially designed and adapted for the formation of cans used in the transportation and storage of ice cream. Such cans are used by wholesale manufacturers to deliver ice cream, water ice, frozen custards, etc., to retail dealers, and are used by the latter as containers for such products while they are being dispensed; the emptied cans being thereafter returned to the wholesalers to be refilled and again distributed. Therefore, such cans must be extremely durable to withstand the repeated rough handling and consequent extreme stresses and wear to which they are inevitably subjected by such hard usage.

Moreover, as cans charged with such perishable commodities must be retained in ice water or other refrigerant liquid, their bodies must be permanently liquid tight, and, in order to prevent contamination of their contents, they must be adapted to be substantially hermetically sealed by their removable closures and yet capable of being instantly opened and closed to facilitate dispensation of their contents. Furthermore, as it is customary to dispense ice cream and similar products by means of substantially hemispherical measuring scoops; such cans must be so designed that substantially all of their contents may be readily removed by such scoops.

Therefore, the object and effect of my invention is to provide cans having the characteristics above contemplated. However, it is to be understood that I do not desire to limit my invention to such specific use.

The process of making cans herein disclosed is claimed in my copending application Serial 542,742 filed March 10, 1922, for Letters Patent of the United States.

In the drawings; Fig. I is a perspective view of a can embodying my invention and provided with a removable lid closure.

Fig. II is a vertical sectional view of the can and closure shown in Fig. I, showing the substantially sealed relation thereof.

Fig. III is a perspective view of a sheet metal cylinder which is the blank from which the body of the can shown in Figs. I and II is formed.

Fig. IV is a perspective view of a cylindrical ring of sheet metal which is the blank adapted to form the flange to support and seal said lid closure on the can body.

Fig. V is an elevation of the ring shown in Fig. IV, but partly expanded toward its final flanged form.

Fig. VI is an elevation of the partly formed can body with the completed flanged ring fitted upon the top thereof; the bottom of said body being flared to receive the bottom plate.

Fig. VII is a diametrical sectional view of a bottom plate adapted to be fitted in the flared end of the can body shown in Fig. VI.

Fig. VIII is a diagrammatic axial sectional view of said can body, flange ring and bottom plate; showing said bottom plate supported upon its spinning mandrel and the opposite end of said body supported upon its expanding and supporting mandrel.

Fig. IX is a fragmentary axial sectional view of said can body and bottom plate, similar to Fig. VIII, but showing the rim of the bottom plate partially spun over the bottom of the can.

Fig. X is a fragmentary, sectional view of substantially full size, showing the joint between the can body and the bottom plate as it exists in a finished can.

Fig. XI is a plan view of a spinning lathe and its appurtances embodying my improvement in can forming mechanism.

Fig. XII is a front elevation of the mechanism shown in Fig. XI.

Fig. XIII is a fragmentary vertical sectional view of the yoked differential plungers and their casing, indicated in Figs. XI and XII, whereby said expanding and supporting mandrel is advanced, to expand the can body in its flange ring, held in such advanced position during the operation of spinning the rim of the bottom plate over the can body, and subsequently retracted to free the can.

Referring to Figs. I to X inclusive, which show a convenient form of ice cream can constructed in accordance with my invention; the can body 1 having the removable lid closure 2, conveniently provided with

the rigid handle 3, is formed of primarily flat sheet metal. A rectangular piece of such metal, conveniently low carbon steel, is first bent to the cylindrical blank form 5 indicated in Fig. III and then united at its abutting edges 6, conveniently by an electric welding operation, to form a blank from which the body of a can such as shown in Figs. I and II is formed. A cylindrical ring 8 of sheet metal, shown in Fig. IV, is similarly bent and united at its abutting edges 9 to constitute a blank from which may be formed the flange ring 10, as a fixture upon said can body 1, as indicated in Fig. II, to support said lid closure 2 and substantially hermetically seal the joint between the bottom edge of said closure and the can, when in the position shown in Fig. II. Said flange ring blank is expanded, by a pressing operation, from the cylindrical form shown in Fig. IV to the form shown in Fig. V; then pushed upon said cylindrical can blank 5 until its upper edge is flush with the top of the latter. Thereupon, the expanded skirt 11 of said ring blank 10 is pressed inwardly, against said blank 5 until it is curled to form the toric bead 12 indicated in Figs. I, II, VI and VIII. That pressing operation constricts said ring bead 12 upon said can blank 5. However, I subsequently expand said can blank 5 within said flange ring 10, slightly stretching the metal of both of said parts, to insure that they shall thereafter remain in intimate contact. Such expansion is conveniently effected by thrusting the mandrel 13 into said blank 5, as indicated in Fig. VIII.

However, during the aforesaid operation of forming said bead 12 upon said can body 5; I find it convenient to expand the bottom edge of said blank 5 as indicated at 14 in Fig. VI, so that said blank will readily fit over the bottom plate 15 as shown in Fig. VIII.

Said bottom plate 15 is also formed from primarily flat sheet metal, by pressing operations which first cut a circular disk of such metal and then distort it to the cylindrical form shown in Fig. VII. It is to be particularly noted that the circumferential edge 16 of the cylindrical portion 17 of said bottom plate 15, which is presented upwardly in the can against the inner face of the cylindrical wall of the latter, as shown in Figs. VIII, IX and X, is substantially sharp so that there is no crevice formed at the junction of said blanks 5 and 15. The flared lower edge 14 of said blank 5 is then constricted upon said cylindrical portion 17 of the bottom plate, as shown in Fig. VIII. Thereafter, the primarily plane annular flange 18 of said bottom plate 15 is bent over the adjacent edge of said can body blank 5, first, as indicated in full lines in Fig. IX, and, finally, to the form shown in Fig. X wherein said annular flange 18 of the bottom plate 15 is cylindrical and in contact with the outer surface of the cylindrical wall of the can body 1; the cylindrical portion 17 of said bottom plate being likewise in contact with the inner surface of said cylindrical wall of the can body 1. As hereinafter described, I find it convenient to thus distort said bottom plate flange 18 while spinning it upon the mandrel 19 held under pressure in opposition to said mandrel 13; while said mandrels 13 and 19 are rotated in coaxial relation.

Finally, said can body 1 is coated, all over, with a film of some material capable of resisting the corrosive effect of water upon the ferric metal parts of the can above described. For instance, I find it convenient to coat the can with such a film 20 of block tin, as indicated in Fig. X; so that the entire surfaces of said can 1 and its closure 2 are smoothly continuous and, consequently, may be readily cleaned by washing them.

Although there are various novel features of procedure in the construction of the can above described; the claims in this case are limited to the mechanism and process whereby the top of the can blank 5 and its ring 10 are expanded, and the bottom of the can constricted upon its bottom plate 15 and the flange 18 of the latter constricted upon said can body as above described.

Said mechanism is shown in Figs. XI and XII, wherein 21 is the base frame supporting the stationary headstock 22 having bearings 23 and 24 for the spindle 25 carrying the pulley 26. Said pulley is mounted to rotate loosely upon said spindle but may be rigidly connected therewith by the clutch 27 which is operable by the hand lever 28. Said spindle 25 carries at its inner end said mandrel 19 above described with reference to Fig. VIII.

Said base frame 21 also supports the tail stock 30 which may be adjusted thereon by means of the hand wheels 32 and 33 but, for the purpose herein contemplated, said tail stock 30 remains in stationary position upon said base frame.

Said tail stock 30 has the bearings 35 and 36 for the thrust plunger 37 which carries at its front end the idle spindle 38 upon which said mandrel 13, above described with reference to Fig. VIII, is rotatable. As shown in Fig. XIII; said thrust plunger 37 extends through the stuffing box 40 into the chamber 41 in the casing 42 and may be thrust forward under pressure of water or other motor fluid admitted to said chamber 41. Said casing 42 has, in axial alinement with said chamber 41, a second chamber, 43, which is slightly smaller in diameter than said chamber 41 and in which the retract-

ing plunger 45 is mounted to reciprocate through the stuffing box 46. Said retracting plunger 45 is provided with the cross head 48 which, as shown in Fig. XI, is connected by the tension rods 49 with the cross head 50 which is adjustably connected with said thrust plunger 37 by means of the nuts 52 which engage a screw thread on said thrust plunger 37, and the arrangement is such that said thrust plunger 37 and retracting plunger 45 are yoked together so that when said plunger 37 is thrust forward, it carries with it said plunger 45 and, when said plunger 45 is retracted, it retracts said thrust plunger 37. Such reciprocatory movement of said plungers is conveniently effected by the two three-way valves 54 and 55 which, as shown in Fig. XII, are conveniently disposed one above the other and have respective hand levers 56 and 57 whereby their respective rotary plugs may be turned to control the passage of the motor fluid to and from said casing 42. That is to say; said valve 54 has the pipe 60 connected with the port 61 leading to said plunger chamber 41, as shown in Fig. XIII, and may be operated to alternately admit and exhaust the motor fluid with respect to said chamber 41 through the respective pressure and exhaust pipes 63 and 64 which are connected to the casing of said valve 54, whereas, said valve 55 is connected by the pipe 66 with the port 67 leading to said retracting pluger chamber 43 and may be operated to alternately admit and exhaust the motor fluid with respect to said chamber 43 through the respective pressure and exhaust pipes 68 and 69 which are connected to the casing of said valve 55.

Said base frame 21 has the bracket 71 carrying the cross slide bed 72 which may be rigidly connected therewith. The cross slide 73 is mounted to be reciporcated upon said bed 72 by the screw 75 having the hand wheel 76. Said cross slide 73 carries the longitudinal slide 78 which may be shifted in the direction of the length of said frame 21 by the screw 79 provided with the hand wheel 80. Said longitudinal slide 78 carries the bearing block 82 in which the spinning roller 83 is mounted to rotate idly upon the stud shaft 84. It is to be understood that the construction and arrangement of said slides is such that said spinning roller 83 may be shifted toward and away from the axis of rotation of said mandrel 19 and also shifted in either direction of the length of said mandrel 19. By manipulating both of said hand wheels 76 and 80 simultaneously, a compound adjustment of the position of said spinning roller 83 may be effected. That is to say; said roller 83 may be simultaneously thrust toward said mandrel 19 and shifted endwise with respect to the latter.

The mechanism above described may be operated as follows: Said mandrel 19 being stationary; a can bottom plate 15 may be fitted thereon, as indicated in Fig. VIII. Said mandrel 13 being retracted, from the position shown in the drawings toward the right; a can body blank 5 having its bottom edge flared as indicated at 14 in Fig. VI, may be manually fitted upon said bottom plate 15 on said mandrel 19 far enough to engage the latter, about one-half the length of the cylindrical portion 17 of said can bottom 15, and the opposite end of said can body 5 be held in axial alinement with said mandrel 13. Thereupon, said valve 54 is operated to admit motor fluid to said chamber 41 of the thrust plunger 37 to thrust the latter forward, to the position shown in the drawings, thereby thrusting said mandrel 13 into said can body 5 and expanding the latter into tight engagement with its flange ring 10, as shown in Fig. VIII, and simultaneously thrusting said can body 5 to the full extent upon the cylindrical portion 17 of the can bottom 15 as shown in the Fig. VIII. However, the flared bottom edge of said body 5 then occupies the position shown in dotted lines in Fig. VIII.

Thereupon, said can should be rotated to spin the bottom flange 18 over the outside thereof as above described. However, if the high pressure necessary to force the mandrel 13 and can blank 5 to the position shown in Fig. VIII be allowed to remain upon the plunger 37, the friction incident to such rotation would be very great. Therefore, in order to relieve the rotary parts of unnecessary friction and yet maintain said mandrels 13 and 19 in the relative position shown in Fig. VIII, to prevent accidental displacement of the can body during the operation of spinning said flange 18; the operator leaves the valve 54 open, as aforesaid, but also opens the valve 55, so as to admit motor fluid to the chamber 43 against the retracting plunger 45 and leaves both valves 54 and 55 open during the spining operation, with the result that the pressure of the motor fluid then effective to hold the parts in the relative position shown in Fig. VIII is merely that incident to the difference in diameter between said thrust plunger 37 and said retracting plunger 45 and merely sufficient to prevent displacement of the can body blank 5 during the spinning operation.

Thereupon, the operator shifts the clutch lever 28 to the left in Fig. XI so that the normally loose driving pulley 26 is rigidly connected with said spindle 25 to positively turn the mandrel 19 in the direction of the arrow marked thereon in Fig. XI and thus positively turn the can blank 5 with said mandrel 13, the latter being wedged therein, as above described. Then, while said parts are thus being rotated, the operator ma-

nipulates said hand wheels 76 and 80 so as to present the spinning roller 83 against the flared edge 14 of the can blank 5 so as to press the same inwardly to cylindrical form and in contact with the cylindrical portion 17 of the bottom plate 15, as indicated in Fig. VIII. Thereafter, the operator manipulates said wheels 76 and 80 so as to cause said spinning roller to bend said flange 18, of the bottom plate 15, from the plane shown in dotted lines in Fig. IX, to the inclined position shown in full lines in Fig. IX, and proceeds to spin said flange 18 to the cylindrical form shown in Fig. X, in contact with the outer surface of said blank 5, thus completing the spinning operation.

Thereupon, in order to release the can, thus completed, from its engagement with the mandrels 13 and 19 as shown in Fig. VIII; the operator shifts the handle 56 of the valve 54 so as to establish communication between the chamber 41 of the thrust plunger 37 and the exhaust pipe 54. Whereupon, the fluid pressure remaining upon the retracting plunger 45 retracts the latter, with said thrust plunger 37, to withdraw said mandrel 13 from the can and permit the latter to be manually removed from said mandrel 19. Thereafter, the can thus completed may be coated with a composition adapted to resist corrosion, and be provided with a lid 2, as above contemplated.

Therefore, it may be observed that the mechanism shown in Figs. XI to XIII inclusive has the capacity for operation both as a press and as a spinning lathe, and I do not desire to limit myself thereto or to the particular method of operation thereof above described, as, of course, it may be otherwise used. Moreover, it is obvious that modifications may be made in the various details of construction and arrangement of the mechanism, without departing from the essential features of my invention, as defined in the appended claims.

I claim:

1. The combination with a base frame; of a headstock mounted on said frame; a spindle journaled in said headstock; means arranged to rotate said spindle, including a loose pulley and a clutch movable to connect and disconnect said pulley and spindle; a mandrel on said spindle adapted to hold a can bottom plate; a tailstock on said base frame; a thrust plunger mounted to reciprocate in said tailstock, in axial alinement with said spindle; a mandrel mounted to rotate at the inner end of said thrust plunger and arranged to engage the top of a can; a plunger casing stationary on said tailstock, having a thrust chamber in which said thrust plunger is mounted to reciprocate, and a port opening into said thrust chamber; said plunger casing also having a retracting chamber, in axial alinement with said thrust chamber, but of smaller diameter and separated therefrom, and a port opening into said retracting chamber; a retracting plunger mounted to reciprocate in said retracting chamber; means yoking said two plungers for simultaneous reciprocation, including cross heads on the respective plungers and tension rods adjustably rigidly connecting said cross heads; said thrust plunger being longitudinally adjustable with respect to said retracting plunger, and having means arranged to secure it in adjusted position, including a nut engaging said thrust plunger and abutting against its cross bar; and respective valves independently operable to admit and exhaust fluid through said ports; whereby said tail mandrel may be thrust toward said head mandrel, to engage a can body between them, and be retracted to release said body.

2. The combination with a base frame; of a headstock mounted on said frame; a spindle journaled in said headstock; means arranged to rotate said spindle; a head mandrel on said spindle adapted to hold a can bottom plate; a tailstock on said base frame; a thrust plunger mounted to reciprocate in said tailstock, in axial alinement with said spindle; a tail mandrel mounted to rotate at the inner end of said thrust plunger and arranged to engage the top of a can; a plunger casing on said tailstock, having a thrust chamber in which said thrust plunger is mounted to reciprocate, and a port opening into said thrust chamber; said plunger casing also having a retracting chamber, in axial alinement with said thrust chamber, but of smaller diameter and separated therefrom, and a port opening into said retracting chamber; a retracting plunger mounted to reciprocate in said retracting chamber; means yoking said two plungers for simultaneous reciprocation, including cross heads on the respective plungers and tension rods adjustably rigidly connecting said cross heads; said thrust plunger being longitudinally adjustable with respect to said retracting plunger, and having means arranged to secure it in adjusted position; and valve means operable to admit and exhaust fluid through said ports; whereby said tail mandrel may be thrust toward said head mandrel, to engage a can body between them, and be retracted to release said body.

3. The combination with a base frame; of a headstock mounted on said frame; a spindle journaled in said headstock; means arranged to rotate said spindle; a head mandrel on said spindle; a tailstock on said base frame; a thrust plunger mounted to reciprocate in said tailstock; a tail mandrel mounted to rotate at the inner end of said thrust plunger; a plunger casing on said tailstock, having a thrust chamber in which

said thrust plunger is mounted to reciprocate, and a port opening into said thrust chamber; said plunger casing also having a retracting chamber, and a port opening into said retracting chamber; a retracting plunger mounted to reciprocate in said retracting chamber; means yoking said two plungers for simultaneous reciprocation; and valve means operable to admit and exhaust fluid through said ports; whereby said tail mandrel may be thrust toward said head mandrel, to engage a can body between them, and be retracted to release said body.

4. The combination with a base frame; of a headstock mounted on said frame; a rotary spindle journaled in said headstock; a head mandrel on said spindle; a tailstock on said base frame; a thrust plunger mounted to reciprocate in said tailstock; a tail mandrel mounted to rotate at the inner end of said thrust plunger; a plunger casing on said tailstock, having a thrust chamber in which said thrust plunger is mounted to reciprocate, and a port opening into said thrust chamber; said plunger casing also having a retracting chamber, and a port opening into said retracting chamber; a retracting plunger mounted to reciprocate in said retracting chamber; means yoking said two plungers for simultaneous reciprocation; and valve means operable to admit and exhaust fluid through said ports; whereby said tail mandrel may be thrust toward said head mandrel, to engage a can body between them, and be retracted to release said body.

5. The combination with a base frame; of a headstock mounted on said frame; a head spindle journaled in said headstock; means arranged to rotate said spindle; a tailstock on said base frame; a thrust plunger mounted to reciprocate in said tailstock, toward and away from said head spindle; a tail spindle mounted to rotate at the inner end of said thrust plunger; a plunger casing on said frame, having a thrust chamber in which said thrust plunger is mounted to reciprocate, and a port opening into said thrust chamber; said plunger casing also having a retracting chamber, and a port opening into said retracting chamber; a retracting plunger mounted to reciprocate in said retracting chamber; means yoking said two plungers for simultaneous reciprocation; and valve means operable to admit and exhaust fluid through said ports; whereby said tail spindle may be thrust toward said head spindle and be retracted.

6. The combination with a base frame; of a headstock mounted on said frame; a spindle journaled in said headstock; means arranged to rotate said spindle; a head mandrel on said spindle; a tailstock on said base frame; a thrust plunger mounted to reciprocate in said tailstock; a tail mandrel mounted to rotate at the inner end of said thrust plunger; a plunger casing on said tailstock, having a thrust chamber in which said thrust plunger is mounted to reciprocate, and a port opening into said thrust chamber; said plunger casing also having a retracting chamber, and a port opening into said retracting chamber; a retracting plunger mounted to reciprocate in said retracting chamber; means yoking said two plungers for simultaneous reciprocation; and valve means operable to admit and exhaust fluid through said ports; whereby said tail mandrel may be thrust toward said head mandrel, to engage a can body between them, and be retracted to release said body; a spinning roller, mounted to rotate on an axis parallel with the common axis of said mandrels; and means, on said base frame, arranged to shift said roller, including a shaft carrying it, a longitudinal slide, carrying said shaft and having screw means arranged to move it axially, and a cross slide, carrying said longitudinal slide and having screw means arranged to move said shaft toward and away from said mandrel axis; said slides being capable of simultaneous movement.

7. The combination with a base frame; of a headstock mounted on said frame; a rotary spindle journaled in said headstock; a head mandrel on said spindle; a tailstock on said base frame; a thrust plunger mounted to reciprocate in said tailstock; a tail mandrel mounted to rotate at the inner end of said thrust plunger; a plunger casing on said tailstock, having a thrust chamber in which said thrust plunger is mounted to reciprocate, and a port opening into said thrust chamber; said plunger casing also having a retracting chamber, and a port opening into said retracting chamber; a retracting plunger mounted to reciprocate in said retracting chamber; means yoking said two plungers for simultaneous reciprocation; and valve means operable to admit and exhaust fluid through said ports; whereby said tail mandrel may be thrust toward said head mandrel, to engage a body between them, and be retracted to release said body; a spinning roller, mounted to rotate on an axis parallel with the common axis of said mandrels; and means, on said base frame, arranged to shift said roller, including a shaft carrying it, a slide, having screw means arranged to move said shaft axially, and a cross slide, having screw means arranged to move said shaft toward and away from said mandrel axis; said slides being capable of simultaneous movement.

8. The combination with a base frame; of a headstock mounted on said frame; a rotary spindle journaled in said headstock; a tailstock on said base frame; a thrust plunger mounted to reciprocate in said tailstock; a tail spindle mounted to rotate at the inner

end of said thrust plunger; a plunger casing, having a thrust chamber in which said thrust plunger is mounted to reciprocate, and a port opening into said thrust chamber; said plunger casing also having a retracting chamber, and a port opening into said retracting chamber; a retracting plunger mounted to reciprocate in said retracting chamber; means yoking said two plungers for simultaneous reciprocation; and valve means operable to admit and exhaust fluid through said ports; whereby said tail spindle may be thrust toward said head spindle, and be retracted; a spinning roller; and slide means, on said base frame, arranged to shift said roller, longitudinally and transversely.

9. The combination with a base frame; of a headstock mounted on said frame; a rotary spindle journaled in said headstock; a tailstock on said base frame; a thrust plunger mounted to reciprocate in said tailstock; a tail spindle mounted to rotate at the inner end of said thrust plunger; a plunger casing, having a thrust chamber in which said thrust plunger is mounted to reciprocate, and a port opening into said thrust chamber; said plunger casing also having a retracting chamber, and a port opening into said retracting chamber; a retracting plunger mounted to reciprocate in said retracting chamber; means yoking said two plungers for simultaneous reciprocation; and valve means operable to admit and exhaust fluid through said ports; whereby said tail spindle may be thrust toward said head spindle, and be retracted; a spinning roller; and manually operable means, on said base frame, arranged to shift said roller toward and away from said spindles.

In testimony whereof, I have hereunto signed my name at Conshohocken, Pennsylvania, this 5th day of April, 1921.

VICTOR MAUCK.

Witnesses:
ANNA T. SCHARFF,
JULIA T. MEYERS.