

Jan. 25, 1949.

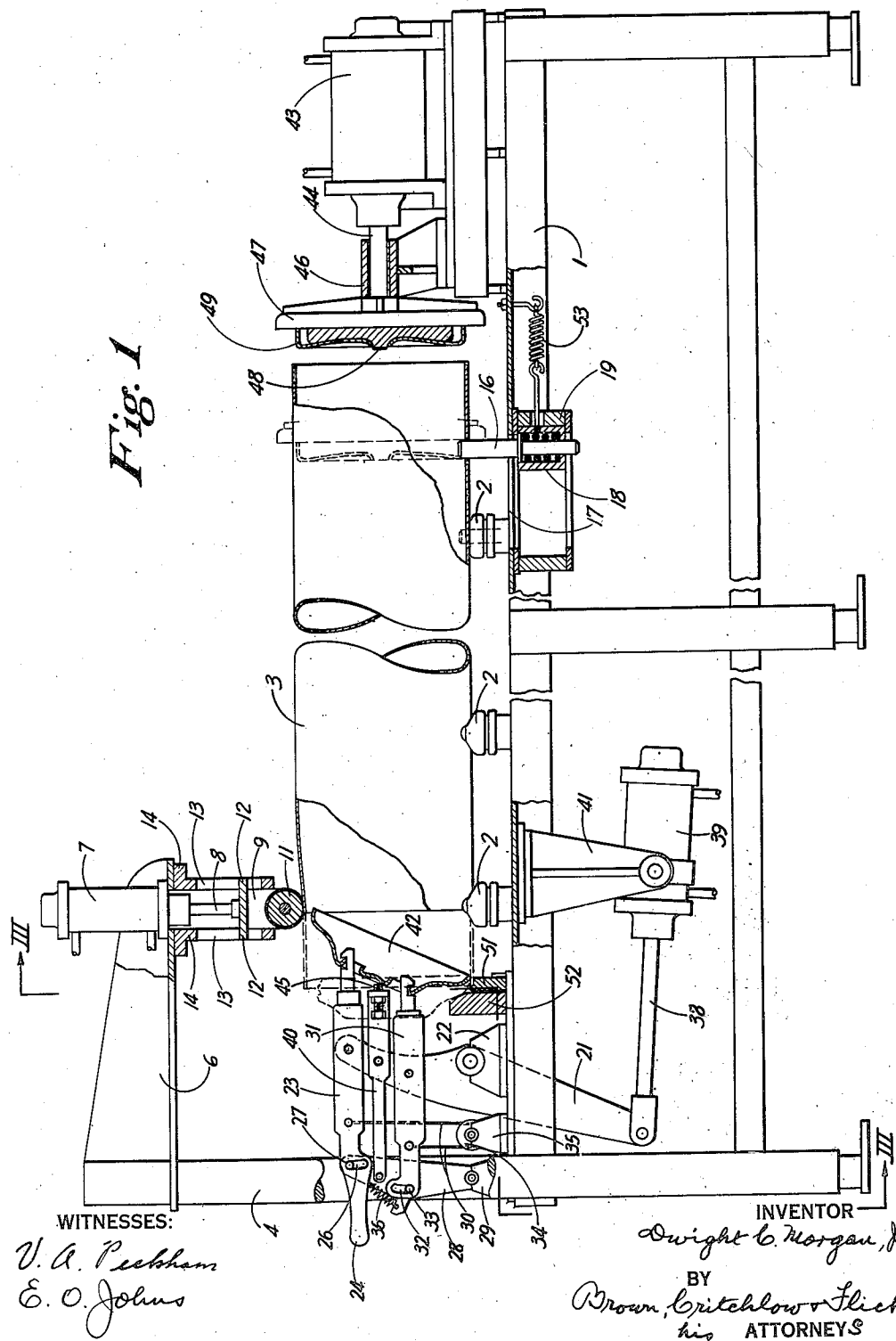
D. C. MORGAN, JR

2,459,954

APPARATUS FOR PRESSING ENDS INTO CYLINDRICAL SHELLS

Filed Aug. 20, 1945

3 Sheets-Sheet 1



Jan. 25, 1949.

D. C. MORGAN, JR

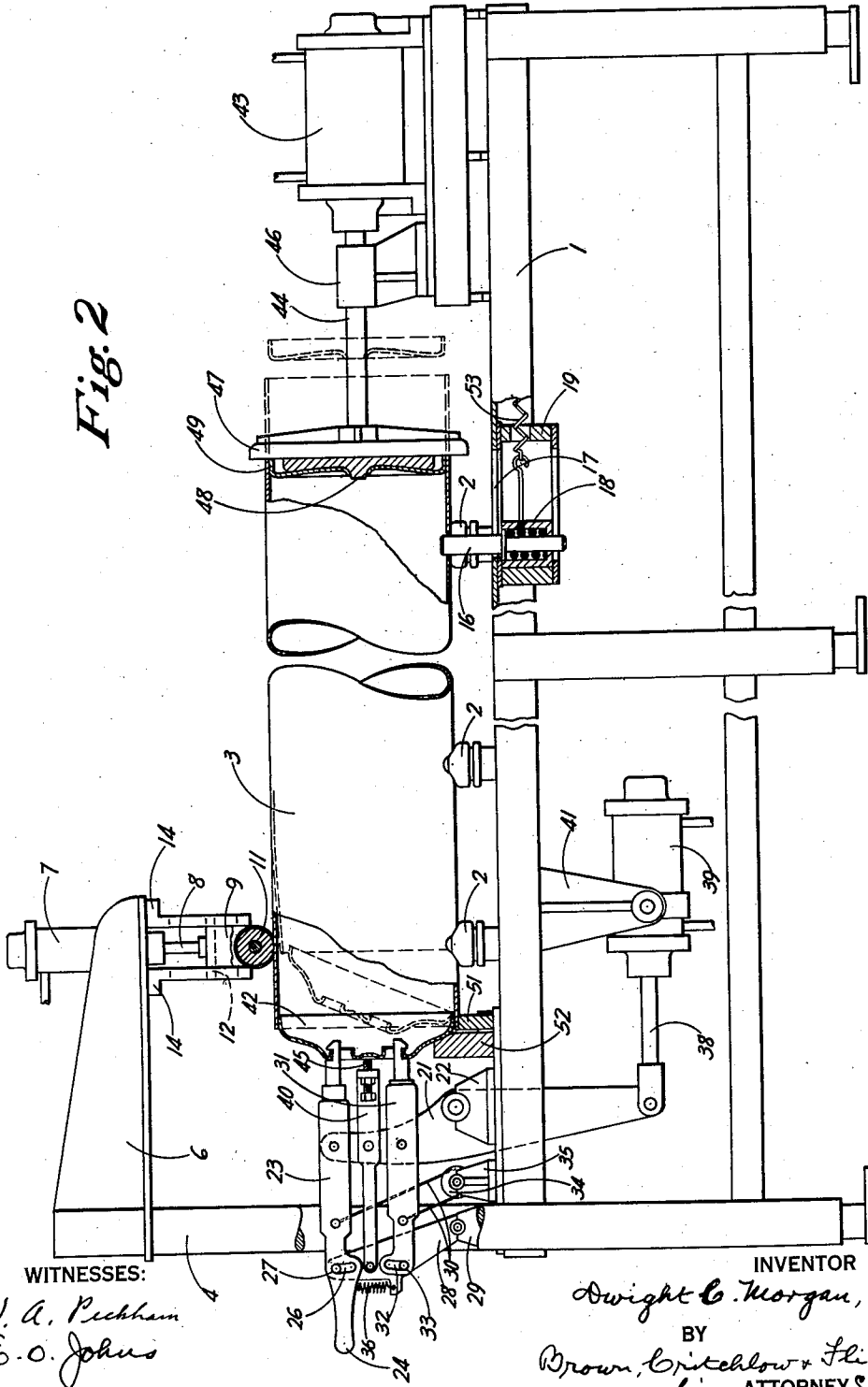
2,459,954

APPARATUS FOR PRESSING ENDS INTO CYLINDRICAL SHELLS

Filed Aug. 20, 1945

3 Sheets-Sheet 2

Fig. 2



Jan. 25, 1949.

D. C. MORGAN, JR

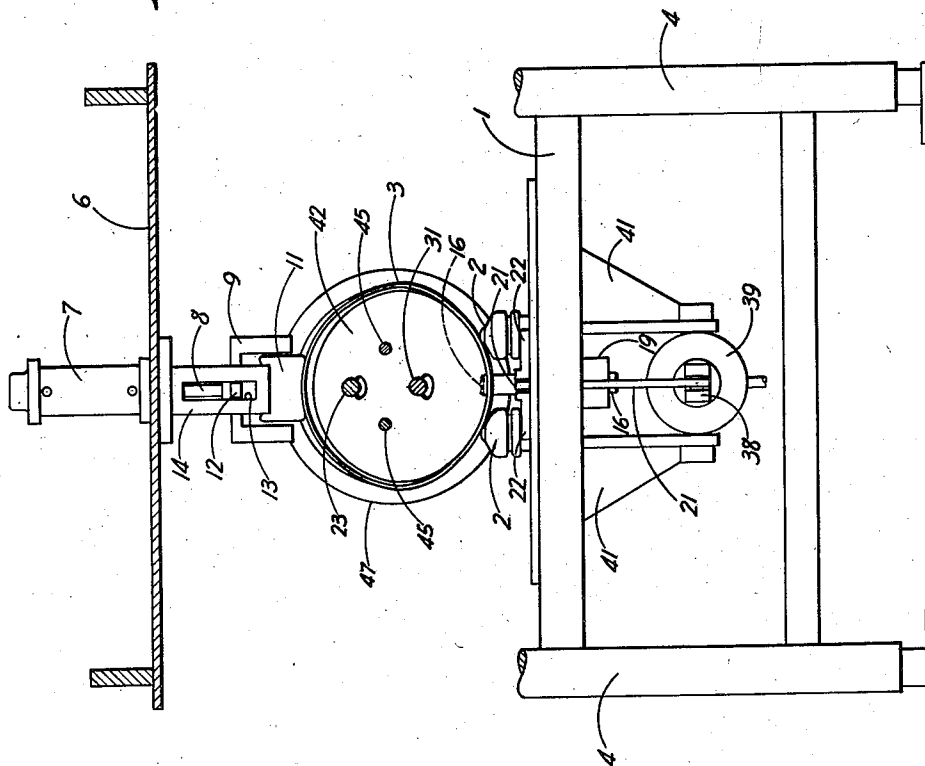
2,459,954

APPARATUS FOR PRESSING ENDS INTO CYLINDRICAL SHELLS

Filed Aug. 20, 1945

3 Sheets-Sheet 3

Fig. 3



WITNESSES:

V. A. Peckham
E. O. Johns

INVENTOR

Dwight C. Morgan, Jr.

BY

Brown, Birchlow & Flick
his ATTORNEYS

UNITED STATES PATENT OFFICE

2,459,954

APPARATUS FOR PRESSING ENDS INTO
CYLINDRICAL SHELLSDwight C. Morgan, Jr., Oakmont, Pa., assignor to
Scaife Company, Oakmont, Pa., a corporation
of Pennsylvania

Application August 20, 1945, Serial No. 611,586

13 Claims. (Cl. 29—235)

1

This invention relates to a method and apparatus for pressing end members into the ends of cylindrical shells, and more particularly to the fitting of heads and bottoms in range boiler shells.

Objects of the invention are to provide such a method and apparatus for easily and quickly producing the desired assembly of parts with a minimum of manual labor.

In accordance with this invention one end of an open end cylindrical shell is compressed slightly to make it oval and thereby increase its diameter in one direction. A circular member or head that is to be fitted in the end of the shell is tilted so that it readily can be inserted in the oval end, preferably by telescoping the shell over the head. The pressure then is released from the oval end of the shell and the head is swung into a plane perpendicular to the axis of the shell, thereby pressing its periphery against the inner surface of the shell. The head preferably is supported in tilted position by arms, both of which can be retracted, one a greater distance than the other, to straighten the head in the shell. The shell may be telescoped over the tilted head by the means by which a bottom member is pushed into the shell. Thus, the bottom may be mounted on a plunger which moves it against the adjacent end of the shell to push the shell forward over the tilted head until the shell is stopped by an abutment. Continued advance of the plunger forces the bottom into the adjoining end of the stationary shell where it is held by frictional engagement with the shell wall.

The preferred embodiment of the invention is illustrated in the accompanying drawings in which Fig. 1 is a side view, partly in section, showing the deformed end of the shell ready to be pushed over the tilted head; Fig. 2 is a similar side view but showing the head and bottom inserted in the shell; and Fig. 3 is a vertical section taken on the line III—III of Fig. 1.

Referring to Figs. 1 and 3 of the drawings, mounted on a table 1 are two rows of bearings 2 for supporting a cylindrical shell 3, such as a range boiler shell, open at both ends. The front legs 4 of the table extend above it and support a rearwardly extending frame 6 on which a vertical fluid pressure cylinder 7 is rigidly mounted. The piston rod 8 from this cylinder extends down through a hole in the frame and supports a bifurcated bracket 9 in which a concave roller 11 is journaled. The bracket has laterally extending lugs 12 that project into vertical slots 13 in parallel vertical-guide members 14 depending from the bottom of the frame. The roller is disposed

2

above the front pair of bearings 2, midway between them. When boiler shell 3 is placed on the bearings its front end is positioned directly below the roller, which at that time is elevated. This position of the shell is assured because the usual spud hole near the bottom of the shell is fitted over a spring-pressed pin 16 projecting up through a longitudinal slot 17 in the table. This pin is mounted in a block 18 that is slidable lengthwise of the table in a guide member 19 connected to the bottom of the table. The pin also insures that the spud hole will be in the correct position relative to the holes in the head that subsequently is mounted in the shell.

Between front bearings 2 and the front end of the table the latter is provided with a longitudinal slot through which a lever 21 extends. The central portion of this lever is pivotally mounted in bearing brackets 22 secured on the table. Fitting over the upper end of this lever to which it is pivotally connected is a slotted horizontal arm 23 having a hook at its inner end and a handle 24 at its outer end. The opposite sides of this arm also are provided with vertical slots 26 that fit over a pin 27 extending through the upper end of a short lever 28. The lower end of this lever is pivotally mounted in a bracket 29 on the table. A second bifurcated arm 31, below and parallel to the one just described, is also pivotally connected to the opposite sides of the long lever. The inner end of this arm is provided with a hook while its outer end has vertical slots 32 fitting over a pin 33 extending through the short lever. A flexible line 30, connected at its opposite ends to the two arms at points between the two levers, extends around a sheave 34 journaled in brackets 35 mounted on the table. A coil spring 36 is connected to the handle end of the upper arm and to the short lever 28 below it.

With this arrangement of arms and links, when handle 24 of the upper arm is raised, it causes line 30 to pull down on the outer end of the lower arm, thereby simultaneously moving the hooks on the inner ends of the arms vertically toward each other. Also, the two levers can be swung rearwardly to locate the hook on the upper arm behind the hook on the lower arm. This is done by suitable means connected to the lower end of long lever 21, such as by a piston rod 38 extending from the lever back to a piston in a fluid pressure cylinder 39. This cylinder is pivotally supported by a pair of brackets 41 secured to the bottom of the table so that the cylinder can rock up and down as the lower end of the long lever moves in an arc. The hooks on the inner

3

ends of arms 23 and 31 are adapted to project through the usual pipe-receiving holes in a range boiler's circular head 42 and to support that head in front of boiler shell 3 with the peripheral flange of the head projecting toward the shell. To prevent the head from tilting sideways, a bifurcated horizontal yoke 40 between arms 23 and 31 straddles levers 21 and 28 to which it is pivotally connected. The rear end of the yoke extends transversely of the table and is located close to head 42. This end of the yoke carries a pair of laterally spaced threaded studs 45 that can be adjusted to engage laterally spaced points on the head, thereby preventing the head from tilting sideways.

Mounted on the rear end of the table is a horizontal fluid pressure cylinder 43 the piston rod 44 of which extends through a bushing 46 in front of it. The front end of the rod carries a circular plunger 47 provided with a central boss 48 adapted to project through the center hole in a range boiler's bottom member 49. Frictional engagement of the boss with bottom 49 holds the bottom on the plunger with its peripheral flange engaging the front face of the plunger.

In using this apparatus the boiler head 42 is slipped over the hooks on the inner ends of arms 23 and 31, and is held in a forward position, such as the dotted line position of Fig. 1. Before or after this, the bottom 49 is placed on the plunger 47 which is in its retracted position shown in Fig. 1. Shell 3 then is rolled onto bearings 2 from a conveyor or skids (not shown) at one side of the table, and it is rotated until positioning pin 16 snaps up into the spud hole near the rear or lower end of the shell. This locates the front or upper end of the shell directly under the depressing roller 11. The operator operates a suitable valve (not shown) to supply fluid under pressure to the top of cylinder 7 so that the roller will press down on the shell and ovalize its front end, thereby increasing its diameter horizontally. Fluid pressure then is admitted to the rear end of cylinder 39 to move upper arm 23 rearwardly to tilt the head, as shown in Fig. 1, so as to reduce the vertical space occupied by the head to less than the vertical diameter of the front end of the shell. Following this, fluid pressure is admitted to the rear end of cylinder 43 at the back of the table so that plunger 47 will move forward and press bottom 49 against the adjacent end of the shell to push the shell forward on bearings 2 until its compressed front end reaches the dotted line position and strikes against concave abutment 51 mounted on the table between the front bearings 2 and the long lever 21. In moving forward, the front end of the shell telescopes freely over the tilted head the lowest point of which is spaced a short distance above abutment 51. Continued forward movement of the plunger forces the bottom into the end of the now stationary shell, as indicated in dotted lines in Fig. 1 and as shown in full lines in Fig. 2.

Cylinder 7 then is reversed to raise the depressing roller 11 so that the front end of the shell will spring back to its original circular shape. The tilted head 42, which now is inside the shell, is swung up into the upright position shown in Fig. 2 when the lower end of long lever 21 is swung rearwardly by supplying fluid under pressure to the front end of cylinder 39. This lever retracts or moves forward arms 23 and 31, but, due to the upper arm being farthest from the fulcrum of the lever, the upper arm is retracted more rapidly than the lower one. This

4

pivots the head about the point at its bottom where it contacts the shell, and pulls the head back against a stop member 52, thereby straightening it in the end of the shell and causing its peripheral flange to tightly engage the inner surface of the shell. Yoke studs 45 hold the head against lateral tilting while it is being pulled into position in the shell. Following this, cylinder 43 is reversed to pull plunger 47 away from bottom 49 and then handle 24 is lifted to release the hooks from the head. This allows a spring 53, connected to pin 16, to pull the shell back to its original position with pin 16 at the rear end of its guide member 19. The shell, with the bottom and head tightly fitted in its opposite ends, now is ready to be removed laterally from the table in preparation for the next operation, which usually is the welding of the bottom and head in the shell.

It will be seen that with this apparatus one operator, with little effort, can quickly press the head and bottom into a range boiler shell, and that the parts will be properly assembled for subsequent welding.

According to the provisions of the patent statutes, I have explained the principle and construction of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. Apparatus for fitting a circular head tightly in one end of a cylindrical shell, comprising means for compressing said end of the shell slightly to make it oval, an arm extending lengthwise of the shell beyond said end, said arm having a front end adapted to be connected to said head, another member adapted to engage said head, said arm being movable forward relative to said member to support said head in tilted position adjacent said oval end of the shell, means for effecting relative movement of the head and shell toward each other to insert the head in said oval end, and means for retracting said arm for straightening the position of the head in the shell after said compressing means has been released from the shell.

2. Apparatus for fitting a circular head tightly in one end of a cylindrical shell, comprising means for compressing said end of the shell slightly to make it oval, spaced arms extending lengthwise of the shell beyond said end, said arms having front ends adapted to engage the head to support said head in tilted position adjacent said oval end of the shell, means for moving the shell axially toward the arms to telescope said oval end over the tilted head, means for releasing said compressing means, and means for moving said arms lengthwise relative to each other in a direction to pull the tilted head into a plane substantially perpendicular to the axis of the shell.

3. Apparatus for fitting a circular head and bottom tightly in the opposite ends of a cylindrical shell, comprising means for supporting the shell, means for holding the bottom adjacent one end of the shell, means for holding the head tilted adjacent the opposite end of the shell, means for compressing the head end of the shell slightly to make it oval, means for pushing the bottom against the shell to telescope said oval end over the tilted head, means for stopping the axial movement of the shell so that the bottom

5

will be pushed into it, means for releasing said compressing means, means for pulling the head into straightened position in the shell, and means for retracting said bottom-pushing means.

4. Apparatus for fitting a circular head tightly in one end of a cylindrical shell, comprising means for supporting the shell on its side, means above one end of the shell for pressing down on it to make the end oval, means adjacent said pressing means for holding a head tilted in line with the shell, means for moving the shell axially toward said head-holding means to telescope said oval end over the head, and means for pulling the tilted head back into upright position after said pressing means has been released from the shell.

5. Apparatus for fitting a circular head tightly in one end of a cylindrical shell, comprising means for supporting the shell on its side, means above one end of the shell for pressing down on it to make the end oval, means adjacent said pressing means for receiving a head in line with the shell, means for moving said head-receiving means lengthwise of the shell to tilt the head, means for moving the shell axially toward said head-receiving means to telescope said oval end over the head, means for releasing said pressing means, and means for pulling the tilted head back into upright position.

6. Apparatus for fitting a circular head tightly in one end of a cylindrical shell, comprising means for supporting the shell on its side, means above one end of the shell for pressing down on it to make the end oval, means adjacent said pressing means for supporting a head and being movable to tilt the head, means for moving the shell axially toward said head-receiving means to telescope said oval end over the head, means for releasing said pressing means, and fluid pressure means for retracting said head-receiving means to pull the tilted head back into upright position.

7. Apparatus for fitting a circular head tightly in one end of a cylindrical shell, comprising means for supporting the shell on its side, means above one end of the shell for pressing down on it to make the end oval, a pair of vertically spaced arms adjacent said pressing means and having ends adapted to support a head in line with the shell, one of said arms being movable forward relative to the other to tilt a head supported thereby, means for moving the shell axially toward said arms to telescope said oval end over the tilted head, and means for retracting said one arm relative to the other one to pull the head back into upright position after said pressing means has been released from the shell.

8. Apparatus for fitting a circular head tightly in one end of a cylindrical shell, comprising means for supporting the shell on its side, means above one end of the shell for pressing down on it to make the end oval, a pair of vertically spaced arms adjacent said pressing means and having ends adapted to support a head in line with the shell, one of said arms being movable forward relative to the other to tilt a head supported thereby, means for moving the shell axially toward said arms to telescope said oval end over the tilted head, a pivotally mounted lever pivoted to said arms, and means for swinging the lever to retract said one arm relative to the other one to pull the head back into upright position after said pressing means has been released from the shell.

9. Apparatus for fitting a circular head tightly

6

in one end of a cylindrical shell, comprising means for supporting the shell on its side; means above one end of the shell for pressing down on it to make the end oval, a pair of vertically spaced arms adjacent said pressing means and having ends adapted to support a head in line with the shell, one of said arms being movable forward relative to the other to tilt a head supported thereby, means for moving the shell axially toward said arms to telescope said oval end over the tilted head, a support, a lever pivoted to said support and projecting above and below it, the upper part of the lever being pivotally connected to said arms, and fluid pressure actuated means connected to the lower end of the lever for swinging it to retract said one arm relative to the other one to pull the head back into upright position after said pressing means has been released from the shell.

10. Apparatus for fitting a circular head tightly in one end of a cylindrical shell, comprising means for supporting the shell on its side, means above one end of the shell for pressing down on it to make the end oval, a pair of vertically spaced arms adjacent said pressing means and having hook ends adapted to support a head in line with the shell, means pivotally supporting said arms for manual movement of their hook ends toward each other, one of said arms being movable forward relative to the other to tilt a head supported thereby, means for moving the shell axially toward said arms to telescope said oval end over the tilted head, and means for retracting said one arm relative to the other one to pull the head back into upright position after said pressing means has been released from the shell.

11. Apparatus for fitting a circular head and bottom tightly in the opposite ends of a cylindrical shell, comprising means for supporting the shell on its side, means for holding the bottom adjacent one end of the shell, means for holding the head tilted adjacent the opposite end of the shell, means for compressing the head end of the shell slightly to make it oval, fluid pressure actuated means for moving said bottom-holding means toward the shell to push said bottom against the shell and thereby telescope said oval end over the tilted head, means for stopping the axial movement of the shell so that the bottom will be pushed into it, means for pulling the head into upright position in the shell after said compressing means has been released, and means for reversing said fluid actuated means to retract said bottom-holding means.

12. Apparatus for fitting a circular head tightly in one end of a cylindrical shell, comprising means for supporting the shell on its side, means above one end of the shell for pressing down on it to make the end oval, a pair of vertically spaced arms adjacent said pressing means and having ends adapted to support a head in line with the shell, one of said arms being movable forward relative to the other to tilt a head supported thereby, means for moving the shell axially toward said arms to telescope said oval end over the tilted head, means for retracting said one arm relative to the other one to pull the head back into upright position after said pressing means has been released from the shell, and means engaging the head to hold it against tilting sideways as it is pulled into upright position in the shell.

13. Apparatus for fitting a circular head tightly in one end of a cylindrical shell, comprising means for supporting the shell on its side means

7

above one end of the shell for pressing down on it to make the end oval, a pair of vertically spaced arms adjacent said pressing means and having ends adapted to support a head in line with the shell, one of said arms being movable forward relative to the other to tilt a head supported thereby, means for moving the shell axially toward said arms to telescope said oval end over the tilted head, a pivotally mounted lever pivoted to said arms, means for swinging the lever to retract said one arm relative to the other one to pull the head back into upright position after said pressing means has been released from the shell, and means connected to said lever between

8

said arms for engaging the head at laterally spaced points to keep it from tilting sideways while it is being pulled into upright position in the shell.

DWIGHT C. MORGAN, JR.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,580,106	Allie	Apr. 13, 1926