

Sept. 20, 1932.

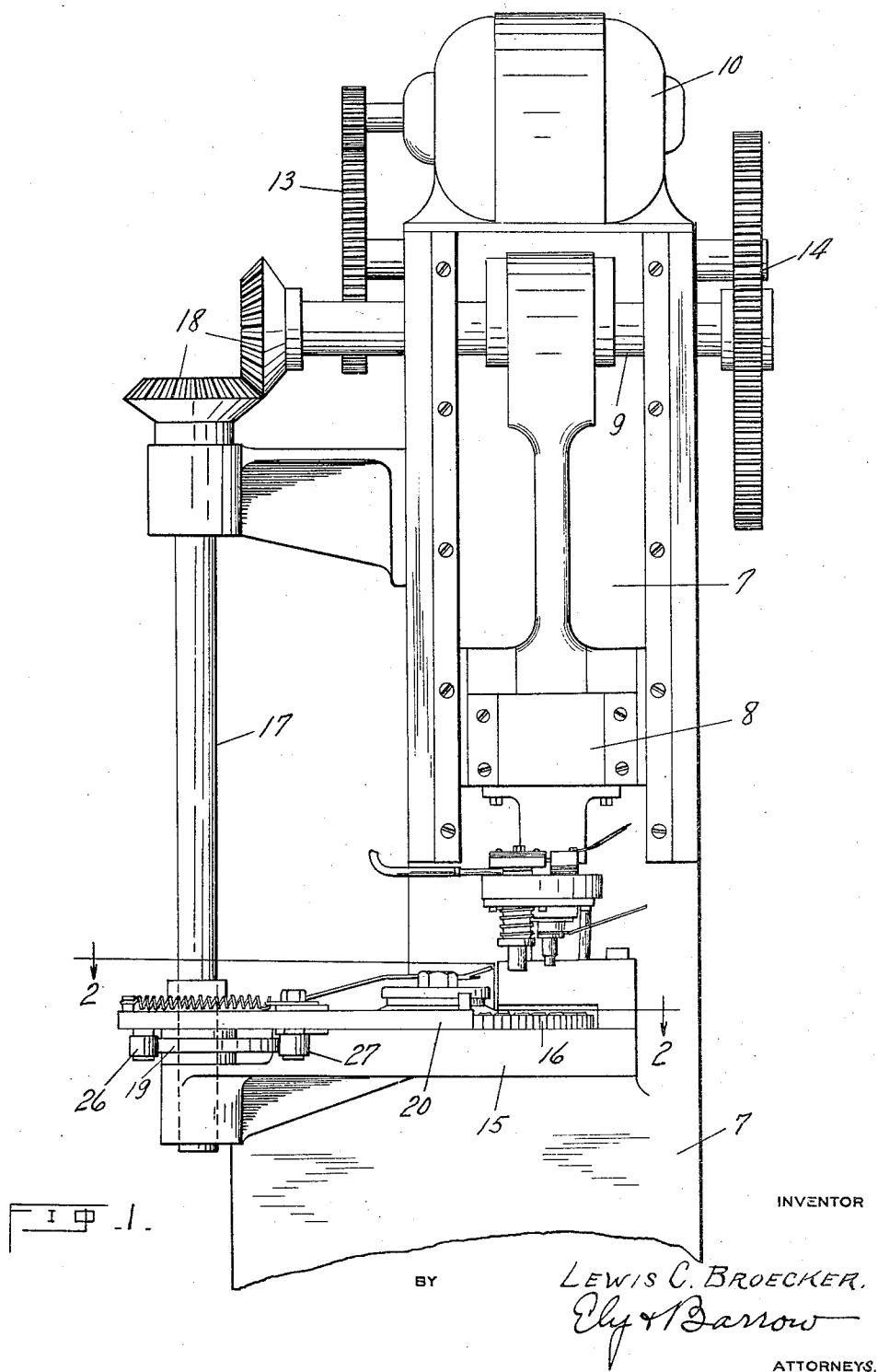
L. C. BROECKER

1,878,575

TIRE VALVE INSIDES ASSEMBLY MACHINE

Filed June 16, 1930

5 Sheets-Sheet 1



Sept. 20, 1932.

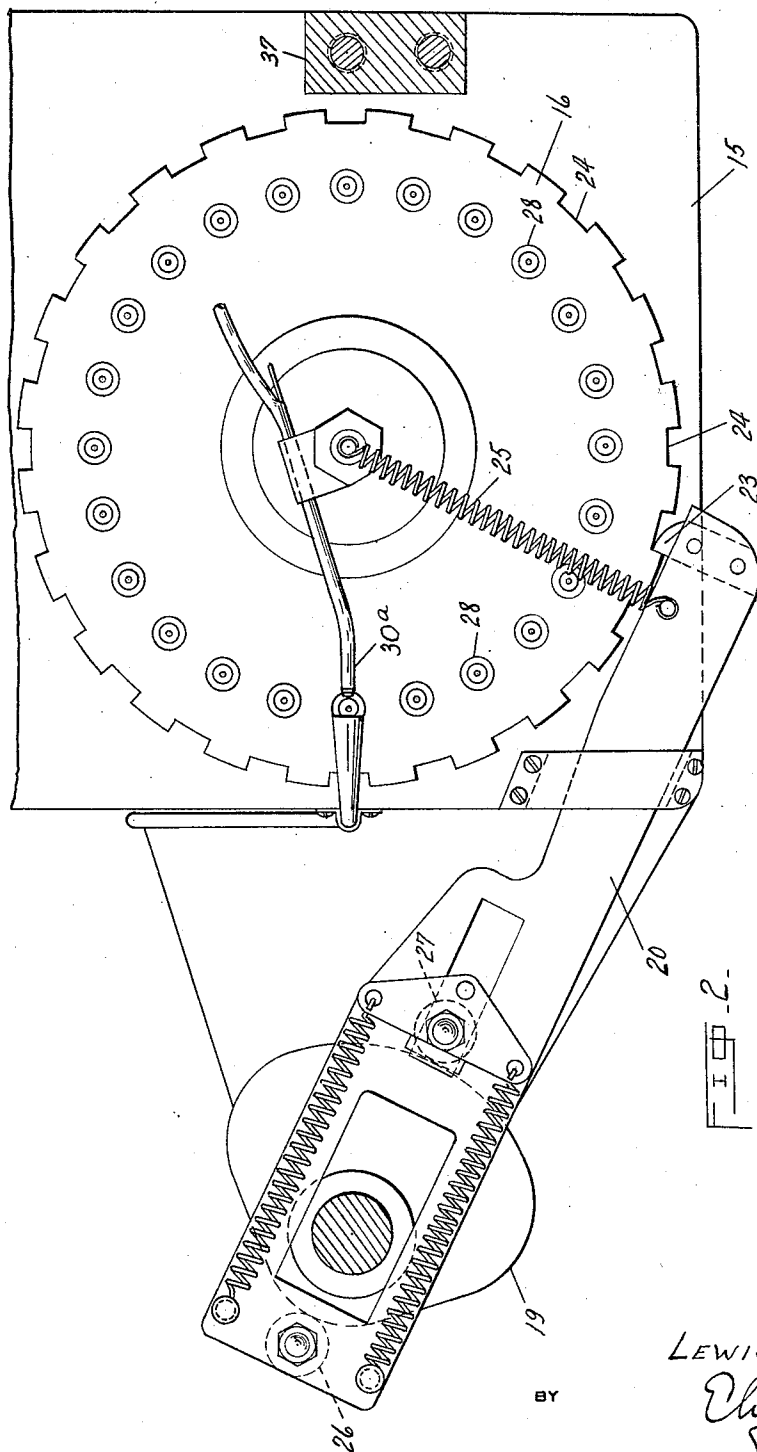
L. C. BROECKER

1,878,575

TIRE VALVE INSIDES ASSEMBLY MACHINE

Filed June 16, 1930

5 Sheets-Sheet 2



INVENTOR

LEWIS C BROECKER,

Chas Barrow

ATTORNEYS.

Sept. 20, 1932.

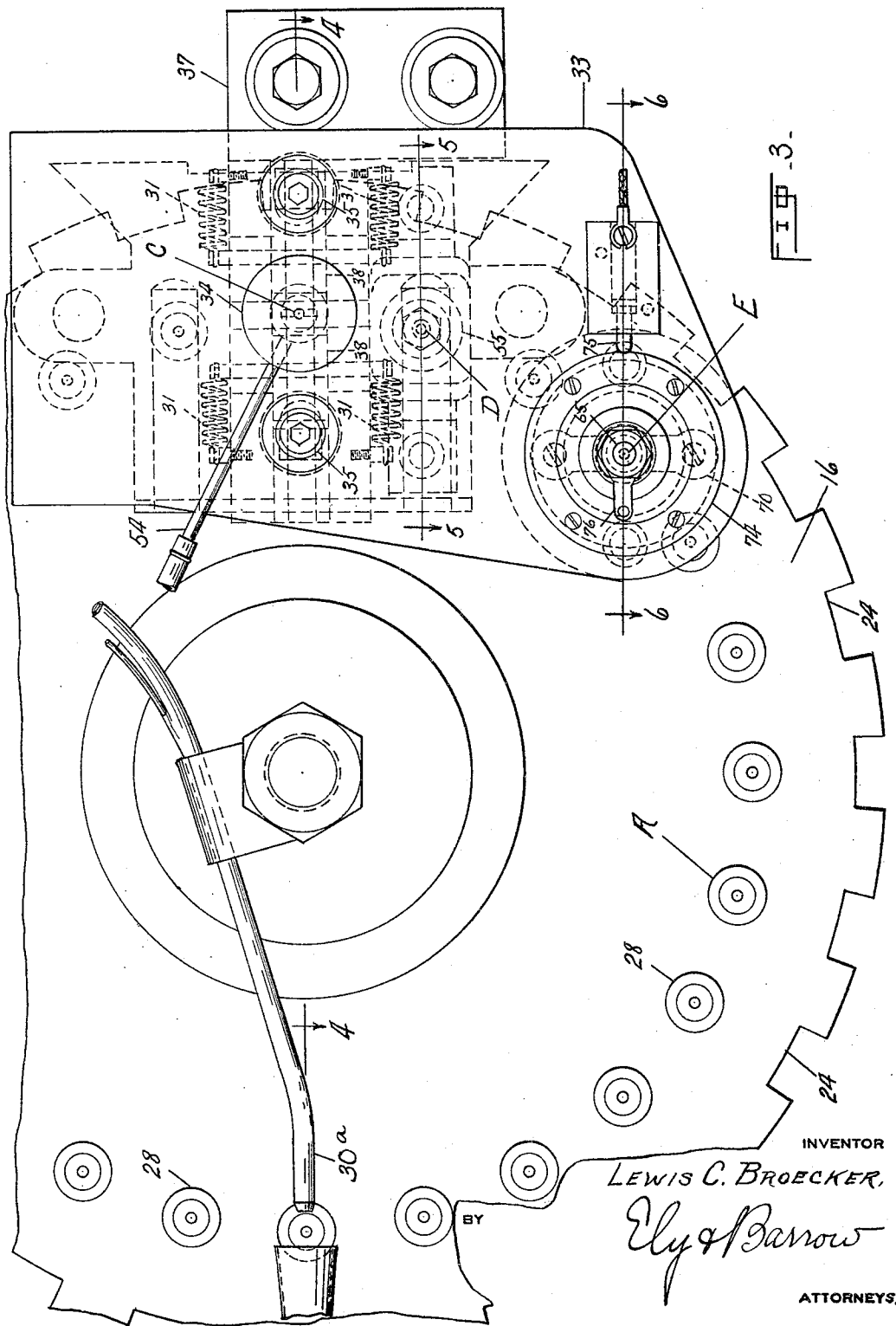
L. C. BROECKER

1,878,575

TIRE VALVE INSIDES ASSEMBLY MACHINE

Filed June 16, 1930

5 Sheets-Sheet 3



Sept. 20, 1932.

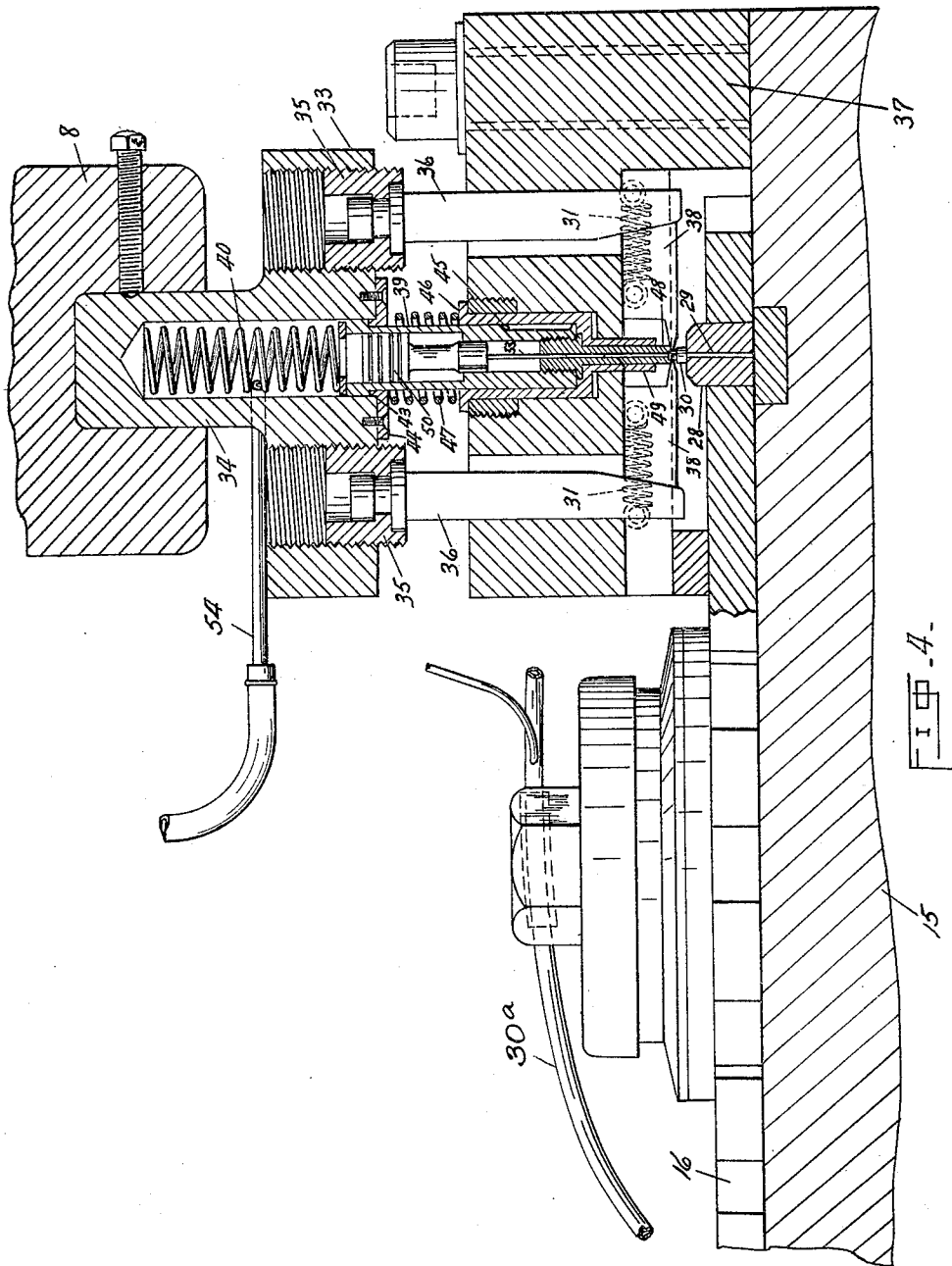
L. C. BROECKER

1,878,575

TIRE VALVE INSIDES ASSEMBLY MACHINE

Filed June 16, 1930

5 Sheets-Sheet 4



INVENTOR

LEWIS C. BROECKER.

Ely & Barrow

ATTORNEYS.

Sept. 20, 1932.

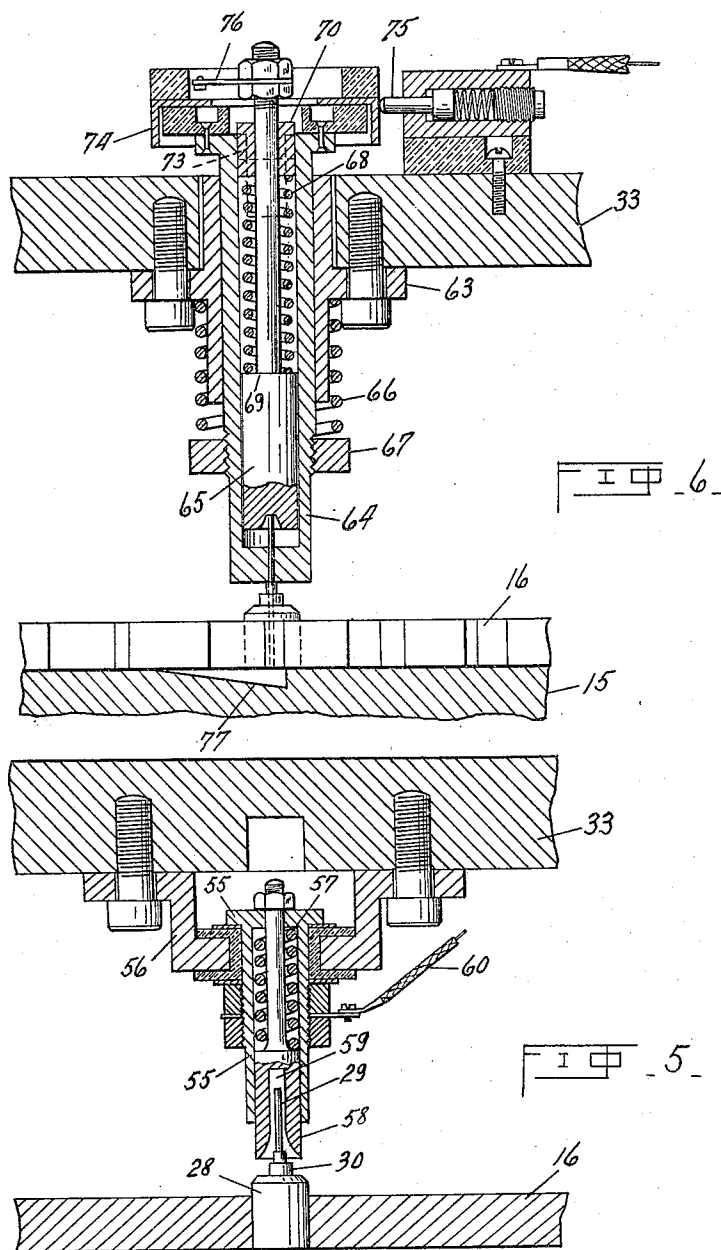
L. C. BROECKER

1,878,575

TIRE VALVE INSIDES ASSEMBLY MACHINE

Filed June 16, 1930

5 Sheets-Sheet 5



INVENTOR

LEWIS C. BROECKER.

BY

Chy & Barrow

ATTORNEYS.

UNITED STATES PATENT OFFICE

LEWIS C. BROECKER, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO THE FIRESTONE STEEL PRODUCTS COMPANY, OF AKRON, OHIO, A CORPORATION OF OHIO

TIRE VALVE INSIDES ASSEMBLY MACHINE

Application filed June 16, 1930. Serial No. 461,310.

This invention relates to apparatus for assembling tire valve insides and for testing the same after assembly.

It is an object of the invention to provide inexpensive and fool-proof apparatus for rapidly and efficiently assembling the washer cup and the center pin.

A further object of the invention resides in providing automatic means in conjunction with the assembling apparatus for rapidly and effectively testing the cup and pin assemblies to see if the pins are bent.

It is also an object of the invention to provide means in combination with the foregoing apparatus to test the assembly to see if the cup is loose on the pin.

The above and other objects of the invention are achieved by the apparatus illustrated in the accompanying drawings and described below, it being understood that the invention is not limited to the specific form thereof shown and described.

In the drawings:

Figure 1 is a front elevation of the apparatus embodying the invention.

Figure 2 is a sectional plan view taken on line 2—2 of Figure 1.

Figure 3 is an enlarged plan view of the punch plate and dial.

Figure 4 is a vertical section taken on line 4—4 of Figure 3.

Figure 5 is a vertical sectional view taken on line 5—5 of Figure 3.

Figure 6 is a vertical sectional view taken on line 6—6 of Figure 3.

Referring to the drawings the numeral 7 indicates the frame of an open back press to which is slidably gibbed a cross-head 8 reciprocated by a crank shaft 9 which is rotatably driven by an electric motor 10 through suitable reduction gearing 13 and 14.

The bed of the press is indicated at 15 and serves to rotatably support a dial 16 which is adapted to be periodically stepped or indexed in coordination with the movement of the cross-head 8. To this end suitable mechanism is provided which may include a vertical shaft 17 journaled on the frame 7, which shaft is driven through miter gears 18 by the

crank shaft 9. The shaft 17 carries a cam 19 which reciprocates a horizontal arm 20. The end of the arm 20 is provided with a tooth 23 which is yieldingly held in engagement with notches 24 by a spring 25. A fixed follower roller 26 makes the movement of the arm 20 positive in one direction while a resiliently positioned follower roller 27 makes the movement yieldingly positive in the other direction.

The dial 16 is provided with an annular ring of spaced bushings 28, each of which serve to receive and hold a valve center pin 29 in an inverted vertical position with the lower ends thereof resting on the bed 15. The pins 29 are heretofore cut to length and provided with an upset shoulder at their middle.

After the pin 29 with the little rubber washer thereon is placed in the bushing at or about station A a cup 30 is slipped over the pin in an inverted position and the dial 16 is moved past a spray pipe 30^a which coats the pin cup and washer with a suitable lubricant such as soap water so that the washer will slip readily into the cup 30.

The pins with the loose cups thereon are stepped around to the crimping station C which is below the cross-head 8 where the cup is fixed to the pin. For this purpose a punch plate 33 is secured to the cross-head by a boss 34. Carried by vertically adjustable plugs 35 in the punch plate 33 are wedges 36 which are slidably received in a die block 37 fixed to the bed 15 at one side of the dial 16. The die block 37 slidably carries a pair of crimping dies 38 on opposite sides of the cup 30 and pin 29 and which are resiliently held in cooperation with the wedges 36 by springs 31 in the up and down movement of the cross-head 8.

Means are provided to yieldably force the cup 30 down against the top of the bushing 28 which includes a hollow plunger 39 slidably carried in a hole in the punch plate 33. The outward or downward movement of the plunger 39 in the punch plate 33, as resiliently caused by the spring 40, is limited by a shoulder 43 engaging with a collar 44 fixed to the punch plate 33. Slidably carried on

the bottom of the plunger 39 by a slot and pin indicated at 45 is a guide 46 which is received in a circular hole in the die block 37. A spring 47 is provided between the guide 46 and the collar 44 to yieldably hold the guide 46 at the limit of its outward movement with respect to the plunger 39.

Fixed to the lower end of the plunger 39 is a hollow spindle 48 which slides over the pin 29 to force the cup 30 down on top of the bushing 28 and which spindle is guided in its movement by the reduced lower end 49 of the guide 46. A piston 50 is slidably carried in the hollow plunger 39 and is secured to a pin 53 which extends through the hollow spindle 48. The piston is operated by fluid pressure supplied from a line 54.

After crimping the cup 30 to the pin 29 the dial 16 is stepped to bring the pin and cup assembly to station D shown in Figure 5 where the pin is tested for straightness. For this purpose a sleeve 55 is insulated from but secured to a bracket 56 which is in turn fixed to the punch plate 33 so that the sleeve is carried in axial alignment with the bushing 28. Yieldably held at the outer end of the sleeve 55 by a spring 57 is a plunger 58 having a hole 59 therein which is somewhat larger than the pin 29. The sleeve 55 is connected by a wire 60 to a solenoid adapted to control the switch of the motor 10. The other side of the solenoid is grounded to the frame of the apparatus.

Referring to Figure 6 the pin and cup assembly is next subjected to the loose cup test at station E. To this end a sleeve 63 is secured to the punch plate 33 and slidably carries a barrel 64 which in turn slidably carries a plunger 65. A spring 66 is provided between a collar 67 on the barrel and the attaching flange of the sleeve 62 and serves to yieldably hold the barrel at its lowermost position on the punch plate. A spring 68 holds the plunger 65 in its lowermost position, one end thereof bearing on a shoulder 69 on the plunger and the other end thereof engaging with a cross-head 70 fixed to the punch plate and serving to slidably journal the upper end of the plunger 65. The barrel is slotted as at 73 so that it can slide with respect to the cross-head 70.

Fixed to but insulated from the top of the barrel 64 above the punch plate 33 is a metal cap 74. One side of a solenoid controlling the switch of the motor 10 is connected to the cap 74 by suitable means such as a spring pressed contact pin 75 through a signal light (not shown). The use of a signal light in the circuit will inform the operator that it was a loose cup and not a bent pin which stopped the apparatus. The other side of the solenoid is connected to the frame of the machine, the circuit thereto being adapted to be completed through a spring contact 76 secured to the

upper end of the plunger 65 when the cup is loose on the pin. The bed 15 is recessed as at 77 to allow the pin 29 to be forced down through the cup 30 if it is loose as hereafter described.

The operation of the device is as follows: The motor 10 is started which reciprocates the cross-head 8 and the punch plate 33 in a vertical direction and which periodically steps the dial 16 around by reciprocating the arm 20 through cam 19. At or about the station A the operator begins to insert pins 29 with the cup washers thereon in the dial bushings 28 in an inverted position. The cups 30 are also slipped over the ends of the pins 29 at this or at a later station.

As the pins 29 with the washers and cups 30 thereon are moved past the pipe 30^a they are sprayed with a soap solution which insures that the washers slip readily into the cups 30 and down against the upset shoulder adjacent the middle of the pin.

Referring to Figure 4, as the pin with the cup loose thereon moves to and comes to rest at the crimping station C the punch plate 33 moves downwardly under the vertical reciprocating force imparted thereto by the cross-head 8. In the downward movement of the punch plate 33, the guide 46 serves to guide the hollow plunger 39 down, thus moving the hollow spindle 48 fixed thereto over the end of the pin 29 so that the cup is urged by the spring 40 behind the plunger 39 down and over the washer and against the bushing 28. Further downward movement of the punch plate 33 causes the wedges 36 to move the crimping dies 38 against opposite sides of the cup base to clamp the cup to the pin. The force of the dies can be adjusted by turning the plugs 35 in or out as will be evident.

When the punch plate 33 raises the crimping dies 38 move away under the action of the springs 31 and then the hollow plunger 39 begins to raise as the shoulder 43 thereon is picked up by the collar 44 secured to the punch plate. Further upward movement will cause the plunger 39 to pick up the guide 46 through the pin and slot connection 45 so that the pin and cup assembly will be free to move laterally with the next stepping of the dial.

The pin 53 secured to the piston 50 prevents the pin 29 with the cup thereon from sticking in the spindle 48 as fluid pressure is provided behind the piston 50 by way of conduit 54 during the raising of the punch plate.

From the crimping station C the pin and cup assembly move on the next stepping of the dial to the station D where the pin is tested to see if it is bent. As seen in Figure 5 if the pin is straight or only slightly bent the downward movement of the punch plate will not close the circuit to the solenoid operating the switch to the motor as the pin will not touch the sidewall of the hole 59 in the plunger.

er 58. If, however, the pin is bent, so that it would cause trouble in the completed valve, the pin will touch the sides of the plunger 58 and will complete the circuit to the solenoid controlling the motor switch so that the motor 10 is stopped when the punch plate 33 and cross-head 8 are in the raised position whereupon the defective pin can be removed by the operator.

10 The cup and pin assembly is next stepped to station E where it is tested to see if the cup 30 is loose on the pin 29. At this station the downward movement of the punch plate 33 moves the barrel 64 down and over the pin 15 29 and against the cup 30. Further downward movement of the punch plate is taken up by the spring 66. The plunger 65 has meanwhile contacted with the end of the pin 29 and the downward movement of the punch 20 plate 33 acting through the cross-head 70 and spring 68 has exerted a force upon the pin 29 tending to force it through the cup 30 and down into the recess 77.

If the cup is tight on the pin the plunger 25 65 will not move down in the barrel 64 but if the pin is loose in the cup the force of the spring 68 will move the pin through the cup and the plunger will drop in the barrel so that the contact 76 will engage with the cap 74 to 30 complete the circuit through the pin 75 to the solenoid controlling the switch for the motor 10. This will stop the cross-head 8 and the punch plate 33 at the top of their travel so that the operator can remove the defective 35 cup and pin.

The assembled and tested cup and pin is removed at station A and is replaced by an unassembled cup and pin which makes the operation of the machine continuous.

40 As many changes could be made in this construction, particularly with respect to the means for signalling or indicating a defective assembly, it is intended that all matter contained in the above description or illustrated 45 in the accompanying drawings shall be interpreted as illustrative only and not in a limiting sense. Accordingly, various modifications of the invention can be resorted to without departing from the spirit of the invention 50 or the scope of the appended claims.

What is claimed is:

1. In combination, a punch plate and a rotatable dial, means for reciprocating said punch plate towards and away from said dial, means for rotatably stepping said dial when the punch plate is away from said dial, an annular ring of spaced bushings in said dial, each being adapted to receive a valve center pin with a loose cup thereon, a die block fixed adjacent said dial, a pair of opposite dies slidably carried in said die block, means on said punch plate adapted to move the cup, in the downward movement of the punch plate, against the top of its bushing when adjacent 65 against the top of its bushing when adjacent

the die block, means on said punch plate for moving said dies against the cup to crimp it on the valve pin, means to test the straightness of the valve pin after the cup is crimped thereon, and means to test the tightness with which the cup is crimped thereon, said testing means being carried on the punch plate. 70

2. In combination, a punch plate and a rotatable dial, means for reciprocating said punch plate towards and away from said dial, means for rotatably stepping said dial when the punch plate is away from said dial, an annular ring of spaced bushings in said dial, each being adapted to receive a valve center pin with a loose cup thereon, a die block fixed adjacent said dial, a pair of opposite dies slidably carried in said die block, means on said punch plate adapted to move the cup, in the downward movement of the punch plate, against the top of its bushing when adjacent the die block, means on said punch plate for moving said dies against the cup to crimp it on the valve pin, and means to test the straightness of the valve pin after the cup is crimped thereon. 75 80 85 90

3. In combination, a punch plate and a rotatable dial, means for reciprocating said punch plate towards and away from said dial, means for rotatably stepping said dial when the punch plate is away from said dial, an annular ring of spaced bushings in said dial, each being adapted to receive a valve center pin with a loose cup thereon, a die block fixed adjacent said dial, a pair of opposite dies slidably carried in said die block, means on said punch plate adapted to move the cup, in the downward movement of the punch plate, against the top of its bushing when adjacent the die block, and means on said punch plate for moving said dies against the cup to crimp it on the valve pin. 95 100 105

4. In combination, a punch plate and a rotatable dial, means for reciprocating said punch plate towards and away from said dial, means for rotatably stepping said dial when the punch plate is away from said dial, an annular ring of spaced bushings in said dial, each being adapted to receive a valve center pin with a loose cup thereon, a die block fixed adjacent said dial, a pair of opposite dies slidably carried in said die block, means on said punch plate adapted to move the cup, in the downward movement of the punch plate, against the top of its bushing when adjacent the die block, means on said punch plate for moving said dies against the cup to crimp it on the valve pin, and means to test the tightness with which the cup is crimped thereon. 110 115 120

5. In combination, a punch plate and a rotatable dial, means for reciprocating said punch plate towards and away from said dial, means for rotatably stepping said dial when the punch plate is away from said dial, an annular ring of spaced bushings in said 125

dial, each being adapted to receive a valve center pin with a loose cup thereon, a die block fixed adjacent said dial, a pair of opposite dies slidably carried in said die block, and means on said punch plate for moving said dies against the cup to crimp it on the valve pin.

6. In combination, a punch plate and a rotatable dial, means for reciprocating said punch plate towards and away from said dial, means for rotatably stepping said dial when the punch plate is away from said dial, an annular ring of spaced bushings in said dial, each being adapted to receive a valve center pin with a loose cup thereon, a die block fixed adjacent said dial, a pair of opposite dies slidably carried in said die block, means on said punch plate adapted to move the cup, in the downward movement of the punch plate, against the top of its bushing when adjacent the die block, means on said punch plate for moving said dies against the cup to crimp it on the valve pin, and means to test the straightness of the valve pin after the cup is crimped thereon, said testing means being carried on the punch plate.

7. In combination, a punch plate and a rotatable dial, means for reciprocating said punch plate towards and away from said dial, means for rotatably stepping said dial when the punch plate is away from said dial, an annular ring of spaced bushings in said dial, each being adapted to receive a valve center pin with a loose cup thereon, a die block fixed adjacent said dial, a pair of opposite dies slidably carried in said die block, means on said punch plate adapted to move the cup, in the downward movement of the punch plate, against the top of its bushing when adjacent the die block, and means on said punch plate for moving said dies against the cup to crimp it on the valve pin.

8. In apparatus of the class described, a rotatable dial adapted to receive a plurality of valve pins, each with a washer receiving cup loose thereon, a cross-head, means for reciprocating said cross-head to and from said dial and for synchronously and periodically indexing said dial, means operated by said cross-head for crimping the cup to the valve pin, means carried by said cross-head for testing the straightness of the valve pin after the crimping of the cup thereon, and means carried by the cross-head for testing the tightness of the valve pin and the cup.

9. In apparatus of the class described, a rotatable dial adapted to receive a plurality of valve pins each with a washer receiving cup loose thereon, a cross-head, means for reciprocating said cross-head to and from said dial and for synchronously and periodically indexing said dial, means for crimping the cup to the valve pin, means for testing the straightness of the valve pin after the crimping of the cup thereon, and means for test-

ing the tightness of the valve pin and the cup.

10. In apparatus of the class described, a rotatable dial adapted to receive a plurality of valve pins, each with a washer receiving cup loose thereon, a cross-head, means for reciprocating said cross-head to and from said dial and for synchronously and periodically indexing said dial, means for crimping the cup to the valve pin, and means for testing the straightness of the valve pin after the crimping of the cup thereon.

11. In apparatus of the class described, a rotatable dial adapted to receive a plurality of valve pins, each with a washer receiving cup loose thereon, a cross-head, means for reciprocating said cross-head to and from said dial and for synchronously and periodically indexing said dial, means for crimping the cup to the valve pin, and means for testing the tightness of the valve pin and the cup.

12. In apparatus of the class described, a rotatable dial adapted to receive a plurality of valve pins, each with a washer receiving cup loose thereon, a cross-head, means for reciprocating said cross-head to and from said dial and for synchronously and periodically indexing said dial, means operated by said cross-head for crimping the cup to the valve pin, and means carried by the cross-head for testing the tightness of the valve pin and the cup.

13. In apparatus of the class described, a rotatable dial adapted to receive a plurality of valve pins, each with a washer receiving cup loose thereon, a cross-head, means for reciprocating said cross-head to and from said dial and for synchronously and periodically indexing said dial, means operated by said cross-head for crimping the cup to the valve pin, and means carried by said cross-head for testing the straightness of the valve pin after the crimping of the cup thereon.

14. In apparatus of the class described, a rotatable dial adapted to receive a plurality of valve pins, each with a washer receiving cup loose thereon, a cross-head, means for reciprocating said cross-head to and from said dial and for synchronously and periodically indexing said dial, means for crimping the cup to the valve pin, means for testing the straightness of the valve pin after the crimping of the cup thereon, said last named means including a hollow plunger adapted to move over the end of the valve pin, and electric means operated by said valve pin touching the side of the hollow plunger to indicate a bent valve pin.

15. In apparatus of the class described, a rotatable dial adapted to receive a plurality of valve pins, each with a washer receiving cup loose thereon, a cross-head, means for reciprocating said cross-head to and from said dial and for synchronously and periodically

cally indexing said dial, means for crimping the cup to the valve pin, means for testing the tightness of the valve pin and the cup, said last named means including a plunger adapted to yieldably urge the pin through the cup, and electric means operated by the movement of the pin through the cup to indicate a loose cup.

LEWIS C. BROECKER.