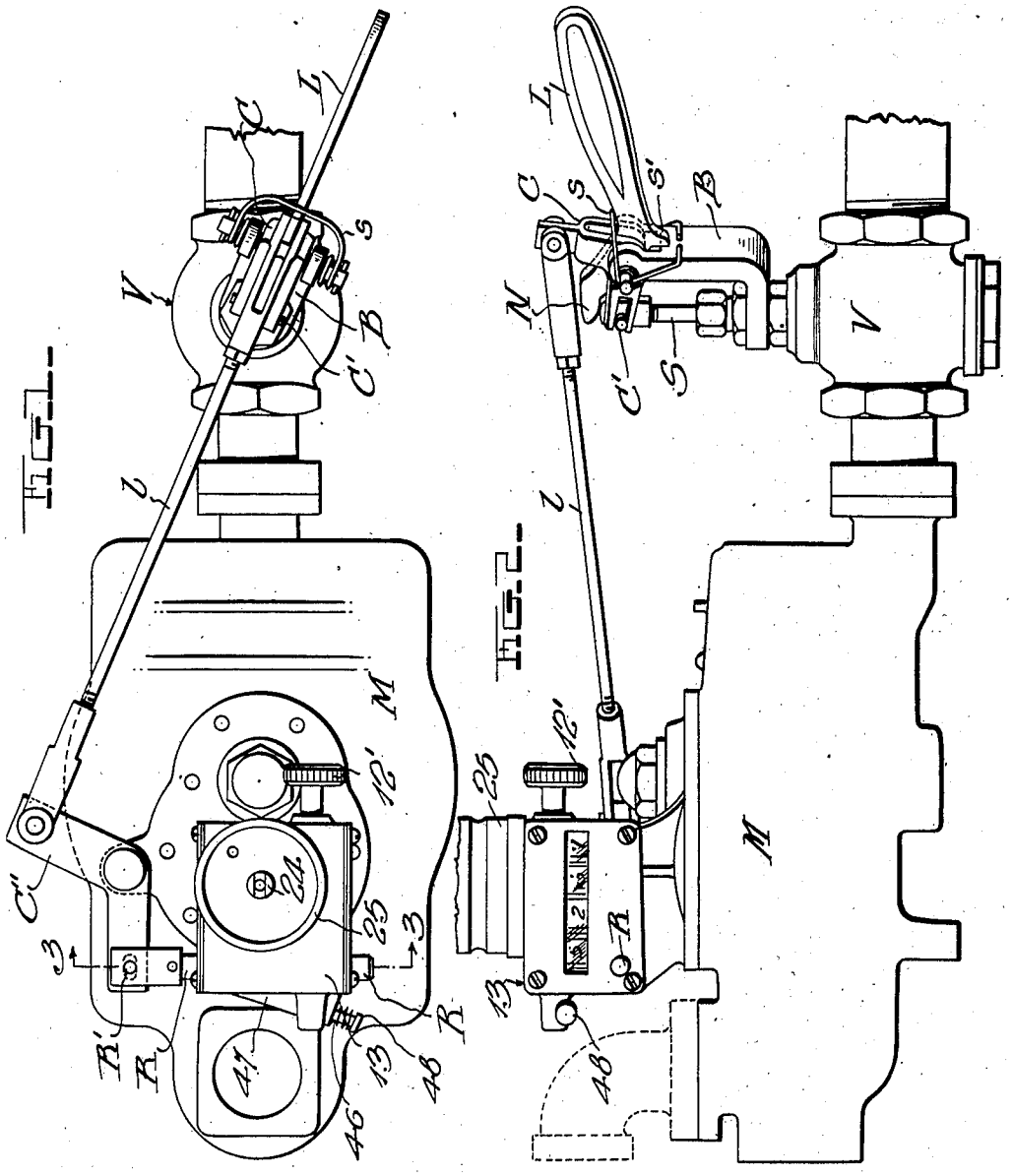
June 30, 1936. W. S. BRUBAKER ET AL 2,046,304

AUTOMATIC CONTROL MEANS

Filed Sept. 26, 1934 3 Sheets-Sheet 1



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AUTOMATIC CONTROL MEANS

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FIG. 3

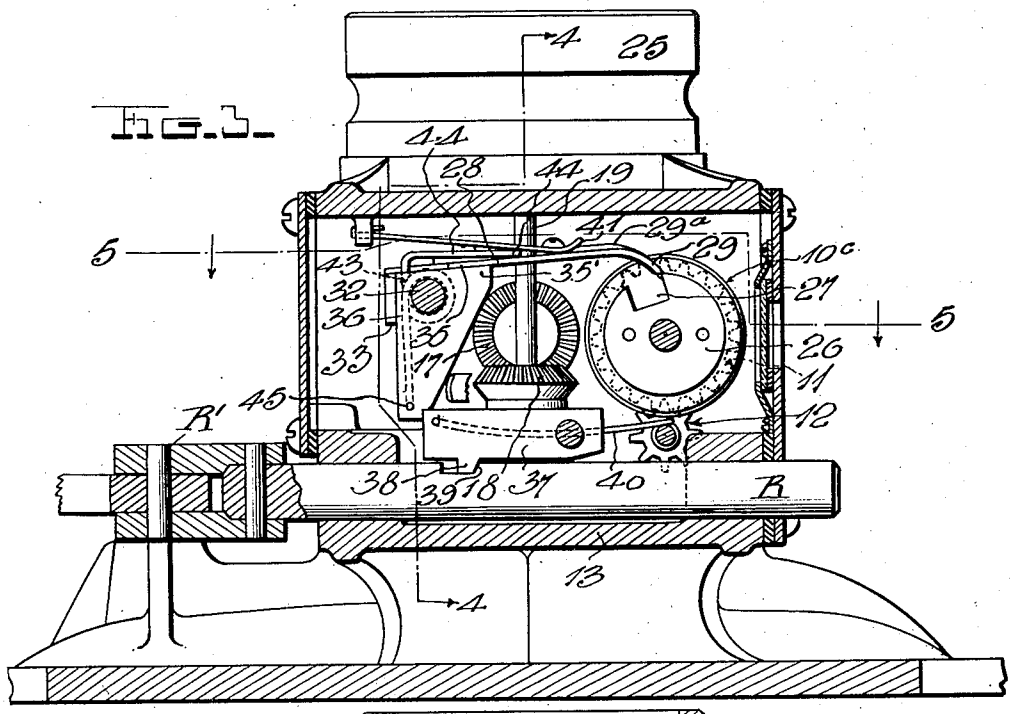
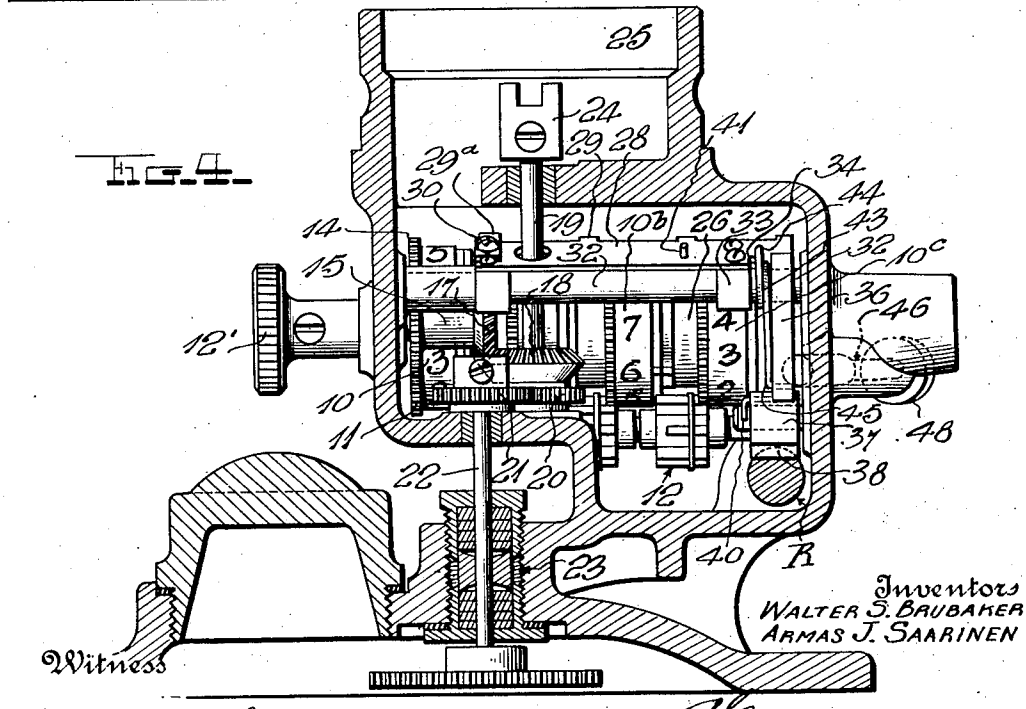


FIG. 4



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AUTOMATIC CONTROL MEANS

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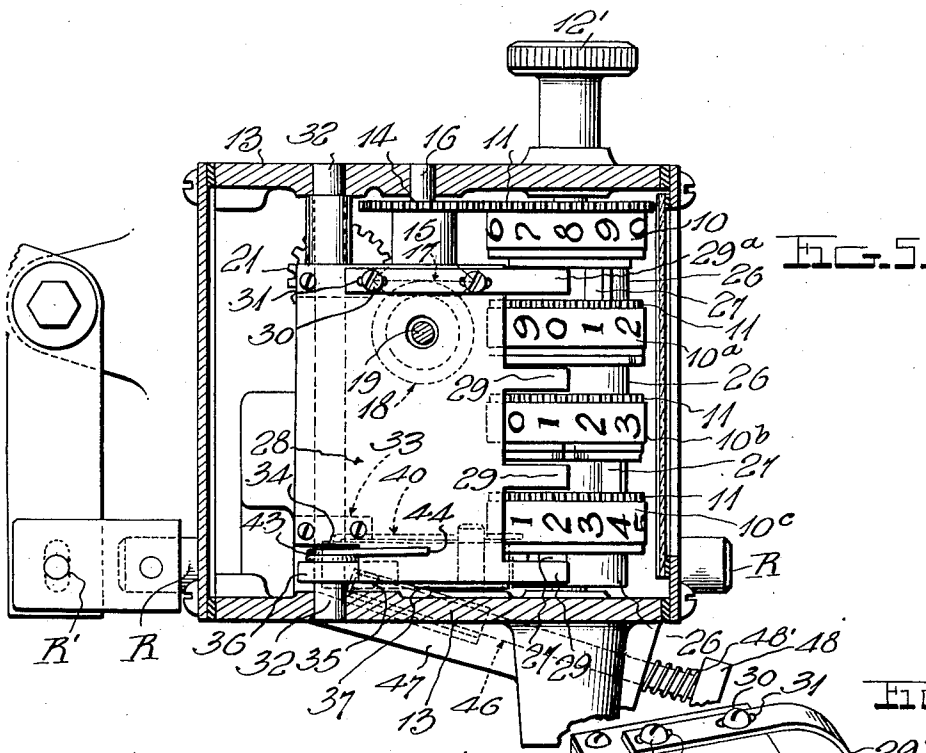


FIG. 5.

FIG. 8.

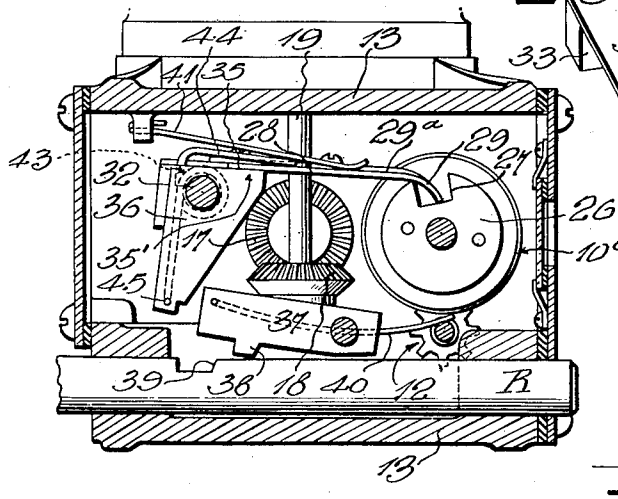


FIG. 6.

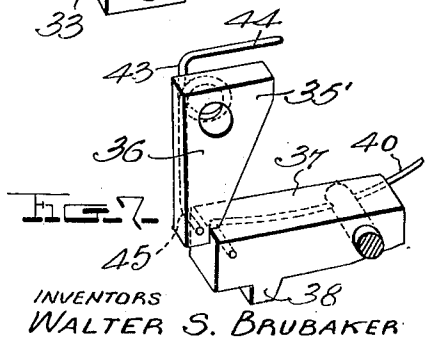


FIG. 7.

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UNITED STATES PATENT OFFICE

2,046,304

AUTOMATIC CONTROL MEANS

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Application September 26, 1934, Serial No. 745,628

8 Claims. (Cl. 235—132)

The invention relates to a control mechanism which normally holds a shiftable work-performing member against shifting but is under the control of a plurality of numeral wheels for automatically allowing said member to shift when said numeral wheels have been driven to predetermined positions. An example of such a mechanism is found in an assemblage of liquid meter, spring-closed liquid shut-off valve, a shiftable member moved in one direction by opening of the valve and necessarily movable in the other direction to allow valve closing, latch means for holding said shiftable member in valve open position, numeral wheels driven by the meter, and means controlled by said numeral wheels for effecting automatic release of said latch means and consequent closing of said shut-off valve when a predetermined quantity of liquid has been dispensed. In such an assemblage, the numeral wheels are first manually set to jointly show the number of gallons to be dispensed, the shut-off valve is then opened to start flow through the meter and is latched open, and said meter retrogradely drives said numeral wheels until they have all returned to zero, at which time release of the latch and closing of the shut-off valve are effected.

We are aware that mechanisms of the above explained type are known, and our invention relates primarily to the latch means, and the releasing means therefor, under control of the numeral wheels.

One object of the invention is to provide a generally simplified and cheapened construction, yet one which will be highly desirable and efficient.

A further object is to provide for so adjusting a portion of the wheel-controlled means with respect to the last of the wheels to arrive at zero, as to insure extreme accuracy. In an assemblage including a liquid meter and a shut-off valve, this is of particular importance to counteract any slippage which may occur between the arrival of the last numeral wheel at zero, and the actual closing of the shut-off valve.

With the foregoing in view, the invention resides in the novel subject matter hereinafter described and claimed, description being accomplished by reference to the accompanying drawings.

Fig. 1 is a top plan view showing the invention in connection with a liquid meter and a liquid shut-off valve.

Fig. 2 is a side elevation of the parts shown in Fig. 1.

Fig. 3 is a vertical sectional view on line 3—3 of Fig. 1, showing the latch means in operative position for holding a shiftable rod which is connected with the shut-off valve, in such position as to hold said valve open, the latch releasing means being held against release by the positions of the numeral wheels although one of these wheels has about arrived at releasing or zero position.

Fig. 4 is a vertical sectional view substantially on line 4—4 of Fig. 3.

Fig. 5 is a horizontal sectional view substantially on line 5—5 of Fig. 3.

Fig. 6 is a view similar to Fig. 3 but showing the latch means released and illustrating the valve-holding rod shifted to its valve-closed position.

Fig. 7 is a perspective view showing the latch which holds the shiftable rod, the dog which holds the latch, and the springs for said latch and dog.

Fig. 8 is a perspective view of the pivotally mounted plate which is controlled by the numeral wheels and serves to release the latch-holding dog when said numeral wheels have been driven to their zero positions.

One form of the invention has been shown and one application thereof, with the understanding however, that variations both as to construction and use, may be made within the scope of the invention as claimed.

A liquid meter has been shown at M and a spring-closed shut-off valve has been illustrated at V, said valve having an operating stem S. A hand lever L is fulcrumed upon a bracket B carried by the valve body and is provided with a nose N to abut the stem S and force the valve to open position when said lever is operated. After operation of this lever, however, a spring *s* restores it to inoperative position, the movement of the lever to this position being limited by a stop *s'*.

A bell crank lever C is fulcrumed on the bracket B and is operatively connected at C' with the stem S, said bell crank being linked at *l* to a second bell crank C'' which is fulcrumed on the casing of the meter M. The bell crank C'' is suitably connected at R' with a rod R, and the present invention is operative to hold this rod in valve open position for a predetermined time and to then release said rod, allowing the valve V to close. When the lever L is operated to open the valve V, the connections between this valve and the rod R slide the latter to the position shown in Fig. 3, said rod being held in this position until a predetermined quantity of liquid has passed through the meter, at which time the rod-holding

means is released, allowing the spring of the valve V to close the latter.

The numeral wheels which are set to jointly show the number of gallons to be dispensed and are then retrogradely driven by the meter M to finally effect release of the rod R, are shown at 10, 10a, 10b and 10c. Wheel 10 is preferably a tenths wheel, 10a a units wheel, 10b a tens wheel, and 10c a hundreds wheel. These wheels are each provided with a driving gear 11 and these gears, of all but the wheel 10, mesh with the usual transfer pinions 12 so that each revolution of wheel 10 will turn wheel 10a one step, ten steps or one full revolution of wheel 10a will turn wheel 10b one step, and ten steps or one complete revolution of wheel 10b will turn wheel 10c one step. The wheels may be individually set by any preferred means, a portion of which is shown in the form of a knob 12' at the exterior of the casing 13 which houses the wheels and the parts hereinafter described.

During such setting, the wheels turn with respect to their gears 11 but at the expiration of their setting movement become again operatively connected with said gears to be operated thereby. The setting means for these wheels and the connections of said wheels with the gears 11, form no part of the present invention and are fully disclosed in our U. S. application Serial No. 743,285, filed September 8, 1934.

The gear 11 of the tenths wheel 10 is driven by the meter M. In the present showing, this gear meshes with a gear 14 on a hub 15 which is rotatable upon a stub 16 carried by the casing 13. The hub 15 also carries a bevel gear 17 meshing with another bevel gear 18 on a vertical shaft 19, said shaft 19 being driven by intermeshing gears 20 and 21 from a vertical shaft 22, said shaft 22 passing through suitable bearing and packing means 23 carried by the top of the meter M and being driven by the metering mechanism in any preferred way. The upper end of shaft 19 is preferably provided with a driving coupling 24 which is instrumental in driving a totalizer (not shown). The cylindrical wall 25 shown projecting upwardly from the casing 13 serves as supporting means for said totalizer.

Each of the wheels 10, 10a, 10b, and 10c carries a control wheel or disk 26 and each of these control wheels or disks is provided with a peripheral notch 27. After setting of the numeral wheels, these wheels are retrogradely driven and when they all arrive at zero, the notches 27 stand in alignment. Fingers on a pivotally mounted plate 28 are co-operable with the control wheels or disks 26 and their notches 27 to normally hold said plate in the position shown in Fig. 3, but to allow said plate to swing toward the wheels as in Fig. 6, at which time it effects release of the holding means for the rod R, allowing said rod to slide to its valve-closed position.

The fingers of the plate 28 which co-act with the wheels or disks 26 of the numeral wheels 10a, 10b and 10c are all denoted at 29 and they may well be integral with one longitudinal edge of said plate. The finger 29a however, which co-acts with the wheel or disk 26 of the numeral wheel 10 is adjustably connected with the plate 28 by means of screws 30 and slots 31. This finger 29a acts to hold the plate 28 against movement until its co-operating notch 27 permits it to move, and at that time all of the other notches are in readiness to receive the fingers 29. The exact time at which the plate 28 will swing towards the wheels is therefore under final control of the finger 29a, and by adjusting this finger slightly circumferentially of the disk or wheel 26 with which it co-acts, extreme accuracy in the operation of the entire mechanism, may be effected and any slippage which might otherwise take place between movement of the plate 28 and actual closing of the shut-off valve V, may be counteracted.

The plate 28 is pivotally mounted upon a shaft 32 fixedly carried by the casing 13, the edge of said plate opposite the fingers 29 and 29a being provided with bearings 33 which surround said shaft.

In the present showing, one end of the plate 28 is formed with a notch 34 and with an abutment portion 35 at one edge of said notch. The abutment portion 35 lies upon a co-acting abutment portion 35' on the upper end of a vertical dog 36 which is pivotally supported by the shaft 32. This dog engages a pivotally mounted latch 37 which holds the rod R in valve-open position. When the plate 28 is permitted to swing toward the numeral wheels, the abutment portions 35 and 35' swing the dog 36 out of engagement with the latch 37 allowing release of the latter and shifting of the rod R to valve-closed position.

The latch 37 is provided with a beveled nose 38 co-acting with a beveled shoulder 39 on the rod R, the bevels of said latch and rod being such that the tendency of said rod to shift under the influence of the valve-closing spring, tends to swing said latch to released position. Such release of the latch, however, is normally prevented by the dog 36 as will be clear from Fig. 3.

A spring 40 is connected with the latch 37 so that said spring serves to move this latch to operative position, where it is held by the dog 36, when the rod R is shifted to its valve-open position. Another spring 41 acting against the plate 28, holds the fingers 29, 29a against the wheels with which they co-act, and also serves to swing said plate when such swinging is permitted by the notches 27.

An angular spring 43 is provided, said spring being coiled at its center around the shaft 32, having one end 44 lying upon the plate 28 and having its other end 45 hooked and engaged with the dog 36. This spring swings the dog 36 to operative position as soon as latch 37 moves to its rod-holding position. It also allows emergency release of the dog 36 should this be required. For effecting such emergency release of dog 36, a push rod 46 passes from the exterior to the interior of the casing 13, being mounted in suitable guiding means 47 in position to engage the inner edge of the dog 36. The outer end of rod 46 is provided with a finger button or the like 48 at the exterior of the casing, by means of which it may be pushed, and said rod is provided also with a return spring 48'. Should it be desired to permit closing of the valve in case of any emergency, the button 48 is pushed, causing the rod 46 to swing the dog 36 to released position, allowing the beveled shoulder 39 on the rod R to force the latch 37 to its released position, allowing valve closing. During such swinging of the dog 36, one of its upper corners merely moves into the notch 34 and the dog therefore has no tendency to swing the plate 28.

When preparing to use the invention to effect automatic valve-closing or perform some other desired duty, the numeral wheels are first set by hand so that they jointly disclose any desired number. During this setting of the numeral wheels, the latch 37 will remain in the position

shown in Fig. 6, and hence will limit the swinging of the dog 36 toward the right, as the fingers 29 and 29a move out of the notches 27 and swing the plate 28 upwardly. The spring 43 allows this plate movement even though the dog 36 cannot move bodily with said plate. After setting the numeral wheels, assuming that the invention be used in an assembly such as that shown, the lever L is operated to open the valve V, starting flow through the meter M. Opening of the valve, it will be recalled, slides rod R from the position shown in Fig. 6 to that shown in Fig. 3. As soon as the rod reaches this position, the spring 40 engages the nose 38 of the latch 37 with the shoulder 39 of said rod, and the dog 36 then immediately engages said latch 37 to hold the latter. The flow through the meter now drives the latter and consequently reversely drives the numeral wheels so that they successively arrive at zero, the hundreds wheel being the first to arrive at zero and the tenths wheel the last to arrive at this point, due to the retrograde rotation of said wheels. When all of the wheels arrive at zero, the notches 27 and fingers 29, 29a allow movement of the plate 28 to the position shown in Fig. 6. During such movement, the abutment portions 35 and 35' swing the dog 36 out of engagement with the latch 37, and the co-acting bevels 38—39 of this latch and the rod R respectively, swing said latch to released position, releasing said rod R and allowing the valve V to close under the influence of its spring.

It will be seen from the foregoing that provision has been made for attaining the objects of the invention in an expeditious manner. Attention, however, is again invited to the possibility of applying the invention in ways other than herein disclosed, and to the fact that variations in structure may be made within the scope of the invention as claimed.

What is claimed is:

1. In a control mechanism having a shiftable member and means urging said member to shift in one direction, said mechanism also having driven control wheels; a shoulder on said shiftable member and a latch abutting said shoulder to normally hold said member against shifting in said one direction until said latch is released the abutting portions of said shoulder and latch being so shaped that the tendency of said shiftable member to shift under the influence of said urging means causes said shoulder to exert a force on said latch tending to move the latter to released position, and means controlled by said wheels for holding said latch against movement to said released position until said wheels have been rotated to predetermined positions.

2. In a control mechanism having a shiftable work-performing member and means urging said member to shift in one direction, said mechanism also having a series of driven coaxial control wheels; a shoulder on said shiftable member and a pivotally mounted latch coacting with said shoulder to normally hold said member against shifting in said one direction as long as said latch is held against release, said shoulder and latch being so shaped that the former tends to release the latter, a pivotally mounted dog normally abutting said latch to prevent release thereof, a plate mounted on an axis parallel with the axis of said wheels, said dog being pivoted coaxially with said plate, and spring means constantly urging said plate to swing toward said wheels, said plate and wheels having coacting portions for preventing such swinging of said plate until said wheels have rotated to predetermined position and for then releasing said plate to allow said spring means to swing said plate toward said wheels, said plate and dog having coacting portions for releasing said dog when said plate is swung toward said wheels.

3. In a control mechanism having a work-performing member to be held for a time and then released, said mechanism also having a series of co-axial driven control wheels; a plate pivotally mounted on an axis parallel with the axis of said wheels, spring means constantly urging said plate to swing toward said wheels, said plate and wheels having coacting portions for preventing such swinging of said plate until said wheels have rotated to predetermined positions and for then releasing said plate to allow said spring means to swing said plate toward said wheels, holding means for the aforesaid member including a dog pivotally mounted near said plate, said plate and dog having coacting portions for releasing said dog when the plate is released and swung toward said wheels, and yieldable means normally holding said dog in operative position.

4. In a control mechanism having a work-performing member to be held for a time and then released, said mechanism also having a series of co-axial driven control wheels; a plate pivotally mounted on an axis parallel with the axis of said wheels, spring means constantly urging said plate to swing toward said wheels, said plate and wheels having coacting portions for preventing such swinging of the plate until said wheels have rotated to predetermined positions and for then releasing said plate to allow said spring means to swing said plate toward said wheels, holding means for the aforesaid member including a dog pivotally mounted on the same axis with said plate, an abutment carried by said plate and engaging said dog to release the latter when said plate is released and swung toward said wheels, and yieldable means normally holding said dog against said abutment.

5. In a control mechanism having a work-performing member to be held for a time and then released, said mechanism also having a series of co-axial driven control wheels; a plate pivotally mounted on an axis parallel with the axis of said wheels, spring means constantly urging said plate to swing toward said wheels, said plate and wheels having coacting portions for preventing such swinging of said plate until said wheels have rotated to predetermined positions and for then releasing said plate to allow said spring means to swing said plate toward said wheels, holding means for the aforesaid member including a dog pivotally mounted on the same axis with said plate, an abutment on said plate for releasing said dog when said plate is released and swung toward the wheels, and a spring engaging said plate and said dog for yieldably holding said dog against said abutment.

6. In a control mechanism, an elongated plate having bearing means at one longitudinal edge and having means at its other longitudinal edge for coaction with control wheels, a shaft passing through said bearing means and pivotally supporting said plate, a member-holding dog pivotally mounted on said shaft and an abutment carried by said plate and engaging said dog to release the latter when the plate is swung in a predetermined direction.

7. In a control mechanism, an elongated plate

having bearing means at one longitudinal edge and having means at its other longitudinal edge for coaction with control wheels, a shaft passing through said bearing means and pivotally supporting said plate, a member-holding dog pivotally mounted on said shaft at one end of said plate and an abutment carried by said plate and engaging said dog to release the latter when the plate is swung in a predetermined direction, said end of said plate having a notch to clear said dog when said plate is reset with the dog temporarily remaining in released position.

8. In a control mechanism, an elongated plate having bearing means at one longitudinal edge and having means at its other longitudinal edge for coaction with control wheels, a shaft passing through said bearing means and pivotally supporting said plate, a member-holding dog pivotally mounted on said shaft, an abutment carried by said plate and engaging said dog to release the latter when the plate is swung in a predetermined direction, and a spring engaging both said dog and said plate for yieldably holding said dog against said abutment.

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DISCLAIMER

2,046,304.—*Walter S. Brubaker* and *Armas J. Saarinen*, San Francisco, Calif. AUTOMATIC CONTROL MEANS. Patent dated June 30, 1936. Disclaimer filed April 13, 1938, by the assignee, *Granberg Meter Corporation.*

Hereby enters this disclaimer to claims 3, 4, 5, 6, and 8 of said Letters Patent.

[*Official Gazette May 24, 1938.*]