April 5, 1932. F. D. SWEET 1,852,134

CONTROL MECHANISM

Filed Aug. 19, 1929

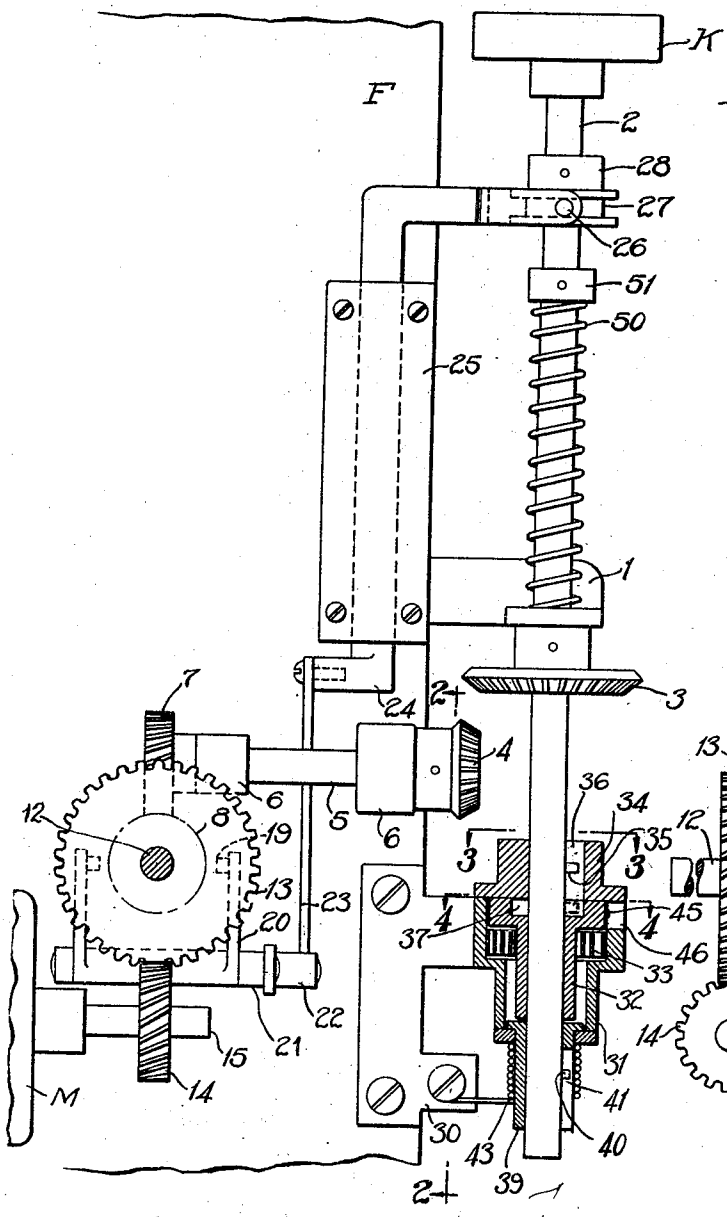


Fig. 1

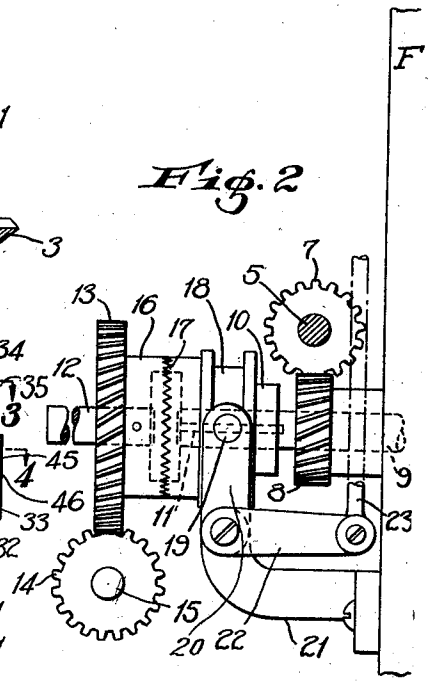


Fig. 2

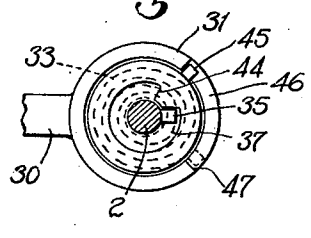


Fig. 4

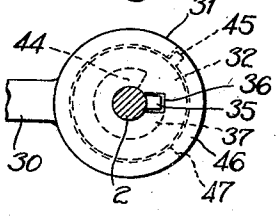


Fig. 3

INVENTOR.
F. D. SWEET
BY Waldo G. Morse
ATTORNEYS.

Patented Apr. 5, 1932 1,852,134

UNITED STATES PATENT OFFICE

FREDERICK DAVENPORT SWEET, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO KINATOME PATENTS CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

CONTROL MECHANISM

Application filed August 19, 1929. Serial No. 386,978.

The present invention can be applied to machines or apparatus which are useful in many different arts. Mechanism constructed according to the present invention is effective to control the operation of a shaft or other machine element in the manner desired, and particularly to subject such shaft or other element first to a predetermined preliminary feeding movement and thereafter to an indefinite feeding movement, such feeding movements being if desired of different characteristics. Another object is to provide means whereby an element or shaft which is normally operated by a source of power such as a motor may be initially operated as for a predetermined number of revolutions by hand. The control mechanism herein described and claimed is particularly applicable to apparatus of the type described and claimed in the copending application of Warren Dunham Foster, Serial Number 356,564, filed April 19, 1929.

Other advantages and characteristics are apparent in the following description, the attached drawings, and the subjoined claims. Although I am showing one preferred embodiment of my invention, it will be readily understood that I am not limited to this particular construction as changes can readily be made without departing from the spirit of my invention or the scope of my broader claims.

In the drawings:

Figure 1 is an elevational view of my control mechanism;

Figure 2 is a sectional view of the same;

Figure 3 is a view taken on the line 3—3 of Figure 1 looking in the direction of the arrows;

Figure 4 is a detail view taken on the line 4—4 of Figure 1 looking in the direction of the arrows.

It will be understood that the present invention may be applied to any desired type of apparatus or mechanism, such as that for example described in the said copending application of the said Foster. Such apparatus or machine may comprise a frame or body section F to which by the bracket 1 the operating shaft 2 is affixed, to the upward end of which is pinned the button K for convenient manual operation. It will be understood that a powered operation of the shaft 2 may be employed if desired and is within the scope of the present invention. Pinned to such shaft 2 is the appropriate gear 3 adapted to cooperate with a suitable gear 4 mounted upon the right hand end of the shaft 5, as viewed in Figure 1, such shaft being supported by the bearings 6 attached to the frame F and carrying at its left hand end, as viewed in Figure 1, the gear 7 which is adapted to cooperate with the gear 8 which is pinned to the shaft 9. Such shaft 9 may be used to operate any desired sprocket, gear or other mechanism.

Mounted upon the shaft 9 is the collar 10 which by the spline 11 is restricted to longitudinal movement relatively to such shaft 9. In line with the shaft 9 is provided the shaft 12, suitably supported by bearings not shown, to which is affixed the gear 13 which cooperates with the gear 14 pinned as upon the shaft 15 which may be operated by any desired source of power such as, for example, the motor M.

Pinned to the shaft 12 is the member 16 terminating in closely spaced serrated teeth adapted to cooperate with the teeth 17 cut in the clutch collar 10. Such collar also includes the groove 18 with which cooperate the fingers 19 affixed to the yoke 20 which is supported by the bracket 21 affixed to the frame F. Operation of the yoke 20 may be through the lever 22 to which is pivotally attached the link 23 one end of which is pivotally attached to the plate 24, supported as in the bearing 25, the upward and right hand portion of which plate, as viewed in Figure 1, terminates in the fingers 26 which cooperate with the groove 27 in the collar 28 attached to the operating shaft 2.

To control the operation of the shaft 2 and hence of the shaft 5 and the parts in train therewith, there is mounted in the bracket 30 the hollow collar 31 through which the operating shaft 2 passes. Mounted within such collar 31 is the control member 32. One end of the flat spring 33 is attached to such control member 32 and the other end of such

spring attached to the inside of the collar 31. The cap 34, attached to the top of the collar 31, serves to confine the member 32. The pin 35 is attached to the shaft 2 and moves longitudinally in the slot 36 in the cap 34 and rotationally in the slot 37 of the member 32. Mounted below and attached to the collar 32 is the sleeve 39. The pin 40 attached to the shaft 2 and working in the slot 41 in such sleeve 39 permits longitudinal movement of the shaft 2 relative to the sleeve 39 but prevents rotation therebetween. Surrounding the sleeve 39 is the coiled spring 43 one end of which is attached to the bracket 30. Such spring permits the rotation of the sleeve 39 and the shaft 2 in one direction only, to wit in a clockwise direction, as viewed in Figures 3 or 4. Attached to the control member 32 is the pin 45 which operates in the slot 46, such slot terminating in the abutting surface 47.

About the shaft 2 is coiled the spring 50 which is confined between the bracket 1 and the collar 51 attached to such shaft 2.

The operation of the device is as follows: The user depresses the button K and the shaft 2 against the pressure of the spring 50 thus placing the gear 3 in contact with the gear 4 and through the plate 24, link 23, lever 22, yoke 20 and fingers 19 moving the collar 10 to the right, as viewed in Figure 2, thus removing the teeth 17 from those cut in the member 16 attached to the gear 13, thereby destroying the operative relation between the motor M and the shaft 9. Rotation of the shaft 2 until the gears 3 and 4 are in mesh is prevented by the pin 35. The user thereupon moves the button K in a clockwise direction, as viewed in Figures 3 and 4, movement in a contrary direction being prevented by the spring 43 coiled about the collar 39. Such movement rotates the pin 35 through the slot 37, such pin coming into contact with the surface 44 of the collar 39 and thereupon moving such collar until the pin 45, moving in the slot 46, reaches the abutting surface 47 at which point further movement is prevented. Such rotation of the button K of the shaft 2 through the gear 3 and 4 has rotated the shaft 5 and the gear 7 and through such gear 8 the shaft 9. In the structure which is shown for purposes of illustration only the gears 3 and 4 are so designed as to produce two rotations of the shaft 5 for every rotation of the shaft 2, but obviously any desired ratio could be employed. At the conclusion of one complete rotation of the shaft 2, the user is compelled to move the button K of the shaft 2 upwardly or to permit such upward movement by the spring 50. Further rotation is prevented by contact with the pin 45 with the abutment 47 and rotation in a contrary direction is prevented by the spring 43. Thus it will be understood that the operative movement of the shaft 2 is restricted to one complete movement in one direction only, and that all elements moved by such shaft 2 are likewise restricted to forward movement for a fixed distance only.

Such upward movement of the shaft 2 and the button K will be effective for permitting the spring 50 to reactuate the clutch which places the shaft 9 in operative relation with the shaft 12, thus permitting the operation of such shaft 9 by the motor M.

Certain of the advantages of the present invention have been stated above or are obvious from the above portion of this specification. Other advantages arise from the provision of safe guards making it impossible for the user to operate or attempt to operate the hand operating mechanism while the shaft 9 is in operative relation with the source of power represented by the motor M. Other advantages arise from the provision of means whereby a shaft or other element may be turned in a predetermined direction only for an exactly predetermined distance. Other advantages arise from the provision of mechanism whereby an operating shaft or other operating mechanism may be moved longitudinally in either direction and rotationally in one direction only and for one complete revolution only. Other advantages arise from the provision of mechanism whereby an operating shaft may be rotated through one complete revolution only at one time, longitudinal movement being required between each complete rotation of such shaft. Other advantages arise from the provision of mechanism whereby a clutch is rendered successively operative or inoperative by the longitudinal movement of the operating shaft such operating shaft being permitted one complete revolution only between each movement of such clutch.

I claim:

1. In combination, a shaft, a support for said shaft in which said shaft is movable rotationally, guiding means restricting the rotation of said shaft to one complete revolution only of approximately 360 degrees, and restricting such rotation to one direction.

2. In combination, a shaft, guiding means which permit the longitudinal movement of such shaft for a predetermined maximum distance, and guiding means which permit the rotation of said shaft for a predetermined number of revolutions intermediate each longitudinal movement of said shaft.

3. As a machine element, a shaft, a support in which said shaft may be moved longitudinally or rotationally, and guiding mechanism necessitating the longitudinal movement of said shaft between each rotational movement thereof.

4. As a machine element, an operating shaft and guiding mechanism therefor, said guiding mechanism including means limiting the first movement of said shaft to longitudinal

movement, means limiting the second movement of said shaft to rotational movement, means limiting such rotational movement to a predetermined number of revolutions, and means limiting the third movement of said shaft to longitudinal movement in a direction opposite to that of said first movement.

5. As a machine element, an operating shaft and guiding mechanism therefor, said guiding mechanism including means limiting the first movement of said shaft to longitudinal movement, means limiting the second movement of said shaft to rotational movement, means limiting such rotational movement to a predetermined number of revolutions, means limiting such rotational movement to one direction, and means limiting the third movement of said shaft to a longitudinal movement in a direction opposite to that of said first movement.

6. As a machine element, a driven member, powered means for driving said member, a handle adapted upon the rotation thereof to drive said member, guiding means for said handle restricting the initial movement thereof to one in a longitudinal direction only and the subsequent movement thereof to one of rotation, and control mechanism interlocking said handle and said powered driving means and constructed and arranged for rendering said powered means inoperative upon said driven member upon such longitudinal movement of said handle.

7. As a machine element, a driven member, powered means for driving said member, a handle adapted upon the rotation thereof to drive said member, guiding means for said handle so constructed and arranged that the movement of said handle is restricted to a cycle of three characteristics of movement: first, a longitudinal movement in one direction whereby said handle is brought into operative connection with said driven member, second, a rotational movement of an automatically pre-determined member of revolutions whereby said driven member is operated, and third a longitudinal movement in the other direction whereby said handle is removed from such operative connection with said driven member; and mechanism connecting said powdered and manual driving means and so arranged that such first movement renders said powered driving means inoperative and said third movement renders said powered driving means operative.

8. As a machine element, a driven member, a source of power, a clutch for connecting said source of power and said member, an auxiliary manually operable means for driving said member, said manually operable means including a handle and a motion transmitting element fixed to said handle and so arranged that a bodily movement of said handle is effective for bringing said element into operative relation with said driven member, and mechanism connecting said powered and manually operable driving means and constructed and arranged for rendering said clutch inoperative upon such movement of said handle.

9. In combination, an operated shaft, a source of power therefor, a clutch for connecting said source of power and said shaft, means whereby said shaft may be manually operated, and connective means interlocking said manual operating means and said clutch so constructed and arranged that said clutch is necessarily made inoperative before the operation of said manual means, that said manual means is necessarily operated for a pre-determined number of cycles, and that clutch is automatically made operative after the conclusion of such pre-determined number of cycles of operation of said manual means.

10. As a machine element, a driven member, mechanism for driving said member, and means for controlling the operation of said mechanism, said means being so constructed and arranged that first said mechanism is moved into operative relation with said member, second said mechanism is necessarily operated for a given number of cycles before it can be withdrawn from such operative relation, and third said mechanism is necessarily withdrawn from such operative relation with said member after such operation for such pre-determined number of cycles and before it can again be rendered operative thereupon.

11. In combination, a driven member, powered means for operating said member, manual means for operating said member, said manual means including a control shaft which is movable longitudinal and rotationally, an operating shaft, gearing connecting one portion thereof to said driven member, a gear affixed to another portion of said operating shaft, a gear attached to said control shaft and adapted for cooperation with said gear attached to said operating shaft when said control shaft is longitudinally moved from a first to a second position and for operating said gear attached to said operating shaft when said control shaft is thereupon rotated, and control mechanism for said manual and powered means, said control mechanism including a support for said control shaft permitting longitudinal or rotational movement thereof, a clutch for operatively connecting or disconnecting said powered means and said driven member, connecting between said shaft and said clutch whereby the longitudinal movement of said shaft in one direction renders said clutch inoperative and the rotational movement thereof is without effect thereon, and means for returning said control shaft from said second to said first position, moving said gears from cooperative relation, and

operating said connection whereby said clutch is rendered operative.

12. As a machine element, an operating shaft and control mechanism therefor, said control mechanism including a fixed collar through which said shaft passes, a slot in said fixed collar parallel to the axis of said shaft, a second collar movable relatively to said first collar through which said shaft passes, a slot in said movable collar cooperating with said slot in said fixed collar and positioned circumferentially of the axis of said shaft, a pin fixed in said shaft movable longitudinally within said slot in said fixed collar to permit the longitudinal movement of said shaft and rotationally movable in said second collar to permit the rotation of said shaft, a formation in said second movable collar cooperating with said slot therein whereby the further movement of said pin rotates said movable collar, and a pin fixed in said movable collar and movable in a slot in said fixed collar whereby the extent of rotation of said movable collar and said first mentioned pin are limited thereby limiting the extent of rotation of said shaft.

13. As a machine element, an operating shaft and control mechanism therefor, said control mechanism including a fixed collar through which said shaft passes, a slot in said fixed collar parallel to the axis of said shaft, a second collar movable relatively to said first collar through which said shaft passes, a slot in said movable collar cooperating with said slot in said fixed collar and positioned circumferentially of the axis of said shaft, a pin fixed in said control shaft movable longitudinally within said slot in said fixed collar to permit the longitudinal movement of said shaft and rotationally movable in said slot in said second collar to permit the rotation of said shaft, means limiting the extent of rotational movement of such shaft, and means limiting the direction of rotational movement.

14. As a machine element, an operating shaft and control mechanism therefor, said control mechanism including a fixed collar through which said shaft passes, a slot in said fixed collar parallel to the axis of said shaft, a second collar movable relatively to said first collar through which said shaft passes, a slot in said movable collar communicating with said slot in said fixed collar and positioned circumferentially of the axis of said shaft, a pin fixed in said shaft and longitudinally movable within said slot in said fixed collar to permit the movement of said shaft and rotationally movable in said slot in said second collar to permit the rotation of said control shaft, a formation in said second movable collar cooperating with said slot therein whereby the further movement of said pin rotates said movable collar, a pin fixed in said movable collar and movable in a slot in said fixed collar whereby the extent of rotation of said movable collar and said first mentioned pin are limited thereby limiting the period of rotation of said shaft, and means for returning said control shaft to its primary position after such rotational movement.

15. In combination, a driven member, a source of power, a clutch for connecting said member and said source of power, manual means for operating said member, said manual means including a control shaft which is movable longitudinally and rotationally, a gear attached thereto, an operating shaft, gearing connecting one portion thereof to said driven member, and a gear affixed to another portion of said operating shaft and positioned for cooperation with said first mentioned gear when said control shaft is longitudinally moved from a first to a second position, and control mechanism for said clutch and said manual means, said control mechanism including means limiting the first movement of said control shaft to a longitudinal movement from said first position to said second position, said previously mentioned gears being brought into cooperative relation by such movement, connection between said control shaft and said clutch whereby said clutch is rendered inoperative by such movement, means limiting the second movement of said control shaft to a rotational movement for a predetermined number of revolutions whereby said gears are operated, and means limiting the third movement of said control shaft to a longitudinal movement in the opposite direction from that of said first movement from said second position to said first position whereby said gears are removed from cooperative relation and said connection renders said clutch operative.

16. In combination, a driven member, a source of power, a clutch for connecting said member and said source of power, manual means for operating said member, said manual means including a control shaft which is movable longitudinally and rotationally, a gear attached thereto, an operating shaft, gearing connecting one portion thereof to said driven member, and a gear affixed to another portion of said operating shaft and positioned for cooperation with said first mentioned gear when said control shaft is longitudinally moved from a first to a second position, and control mechanism for said clutch and said manual operating means, said control mechanism including means limiting the first movement of said control shaft to a longitudinal movement from said first position to said second position, said previously mentioned gears being brought into cooperative relation by such movement, connection between said control shaft and said clutch whereby said clutch is rendered inoperative by such longitudinal movement, means limiting the second movement of said control shaft

to a rotational movement in a predetermined direction whereby said gears are operated, and means limiting the third movement of said control shaft to a longitudinal movement in the opposite direction from that of said first movement from said second position to said first position whereby said gears are removed from cooperative relation and said connection renders said clutch operative.

17. In combination, a driven member, a source of power, a clutch for connecting said member and said source of power, manual means for operating said member, said manual means including a control shaft which is movable longitudinally and rotationally, a gear attached thereto, an operating shaft, gearing connection one portion thereof to said driven member, and a gear affixed to another portion of said operating shaft and positioned for cooperation with said first mentioned gear when said control shaft is longitudinally moved from a first to a second position, and control mechanism for said clutch and said manual operating means, said control mechanism including means limiting the first movement of said control shaft to a longitudinal movement from said first position to said second position, said previously mentioned gears being brought into cooperative relation by such longitudinal movement, connection between said control shaft and said clutch whereby said clutch is rendered inoperative by such longitudinal movement, means limiting the second movement of said control shaft to a rotational movement whereby said gears are operated, and means limiting the third movement of said control shaft to a longitudinal movement in the opposite direction from that of said first movement from said second position to said first position whereby said gears are removed from cooperative relation and said connection renders said clutch operative.

18. As a machine element, on operating shaft and control mechanism therefore, said control mechanism comprising a fixed collar through which said shaft passes, a slot in said fixed collar parallel to the axis of said shaft, a second collar movable relatively to said first collar through which said control shaft passes, a slot in said movable collar communicating with said slot in said fixed collar and positioned circumferentially of the axis of said shaft, a pin fixed in said shaft and longitudinally movable within said slot in said fixed collar to permit the longitudinal movement of said shaft and rotationally movable in said slot in said second collar to permit the rotation of said shaft, a formation in said second movable collar cooperating with said slot therein whereby the further movement of said pin rotates said movable collar, a pin fixed in said movable collar and movable in a slot in said fixed collar whereby the extent of rotation of said movable collar and of said first mentioned pin are limited thereby limiting the extent of rotation of said shaft, a spring attached to said movable collar and said fixed collar whereby said movable collar is returned to its primary position after the rotation thereof and the removal of the first mentioned pin from the slot therein, a third collar through which said control shaft passes, said third collar being loosely mounted upon said first fixed collar, a slot in said third collar parallel to the axis of said control shaft, a pin fixed in said control shaft and movable longitudinally in said last mentioned slot whereby the longitudinal movement of said control shaft is permitted, a wire spring coiled about said third collar and attached thereto and to a fixed support whereby the rotation of said shaft is permitted in one direction only, and a spring for returning said shaft to its primary position after the longitudinal movement thereof.

19. In combination, a driven member, a source of power, manual means for operating said member, said manual means including a control shaft which is movable longitudinally and rotationally, a gear attached thereto, an operating shaft, gearing connecting one portion thereof to said driven member, and a gear affixed to another portion of said operating shaft and positioned for cooperation with said first mentioned gear when said control shaft is longitudinally moved from a first to a second position, and control mechanism, said control mechanism including a fixed collar through which said control shaft passes, a slot in said fixed collar parallel to the axis of said control shaft, a second collar movable relatively to said first collar through which said control shaft passes, a slot in said movable collar cooperating with said slot in said fixed collar and positioned circumferentially of the axis of said control shaft, a pin fixed in said control shaft and movable longitudinally within said slot in said fixed collar to permit the movement of said control shaft from said first to said second position and rotationally in said slot in said second collar to permit the rotation of said control shaft whereby said gears are operated, a formation in said second movable collar cooperating with said slot therein whereby the further movement of said pin rotates said movable collar, a pin fixed in said movable collar and movable in a slot in said fixed collar whereby the extent of rotation of said movable collar of said first mentioned pin and of said control shaft are limited thereby limiting the period of operation of said gears, a spring attached to said movable collar and said fixed collar whereby said movble collar is returned to its primary position after the rotation thereof and the removal of said first mentioned pin from the slot therein, a third collar through which said control shaft passes, said third collar being

loosely mounted upon said first fixed collar, a slot in said third collar parallel to the axis of said control shaft, a pin fixed in said control shaft and movable longitudinally in said last mentioned slot, a wire spring coiled about said third collar and attached thereto and to a fixed support whereby the rotation of said control shaft is permitted in one direction only, a clutch for operatively connecting or disconnecting said powered means and said driven member, connection between said control shaft and said clutch whereby the longitudinal movement of said control shaft in one direction renders said clutch inoperative and the rotational movement thereof is without effect thereon and the longitudinal movement of said control shaft in the other direction renders said clutch operative, and a spring for longitudinally moving said control shaft from said second to said first position, moving said gears from cooperative relation, and operating said connection whereby said clutch is rendered operative.

20. In combination, a driven member, a shaft for driving said member, a source of power, a clutch for connecting said member and said source of power, said clutch including a first clutch surface mounted upon said driving shaft for longitudinal movement relatively thereto and rotational movement therewith, a second clutch surface for cooperation with said first clutch surface and connected with said source of power, manual means for operating said member, said manual means including a control shaft which is movable longitudinally and rotationally, a gear attached thereto, an operating shaft, gearing connecting one portion thereof to said shaft for driving said driven member, and a gear affixed to another portion of said operating shaft and positioned for cooperation with said first mentioned gear when said control shaft is longitudinally moved from a first to a second position, and control mechanism for said clutch and said manual operating means, said control mechanism including a fixed collar through which said control shaft passes, a slot in said fixed collar parallel to the axis of said control shaft, a second collar movable relatively to said first collar through which said control shaft passes, a slot in said movable collar communicating with said slot in said fixed collar and positioned circumferentially of the axis of said control shaft, a pin fixed in said control shaft and movable longitudinally within said slot in said fixed collar to permit the movement of said control shaft from said first to said second position and rotationally in said slot in said second collar to permit the rotation of said control shaft whereby said gears are operated, a formation in said second movable collar cooperating with said slot therein whereby the further movement of said pin rotates said movable collar, a pin fixed in said movable collar and movable in a slot in said fixed collar whereby the extent of rotation of said movable collar of said first mentioned pin and of said control shaft are limited thereby limiting the period of operation of said gears, a spring attached to said movable collar and said fixed collar whereby said movable collar is returned to its primary position after the rotation thereof and the removal of said first mentioned pin from the slot therein, a third collar through which said control shaft passes, said third collar being loosely mounted upon said first collar, a slot in said third collar parallel to the axis of said control shaft, a pin fixed in said control shaft and movable longitudinally in said last mentioned slot, a wire spring coiled about said third collar and attached thereto and to a fixed support whereby the rotation of said control shaft is permitted in one direction only, connection between said control shaft and the first clutch surface whereby the longitudinal movement of said control shaft in one direction removes said first clutch surface from cooperative relation with said second clutch surface and the rotational movement thereof is without effect upon said first clutch surface and the longitudinal movement of said control shaft in the opposite direction places said first clutch surface in cooperative relation with said second clutch surface, and a spring for longitudinally moving said control shaft from said second to said first position, moving said gears from cooperative relation, and placing said first clutch surface in cooperative relation with said second clutch surface whereby said driven member is driven by said source of power.

Signed at Adrian, Mich., in the county of Lenawee and State of Michigan, this 15th day of August, A. D. 1929.

FREDERICK DAVENPORT SWEET.