Oct. 3, 1961 I. L. LOPATA 3,002,599

INFINITELY AND POSITIVELY ADJUSTABLE METERING DRIVING MECHANISM

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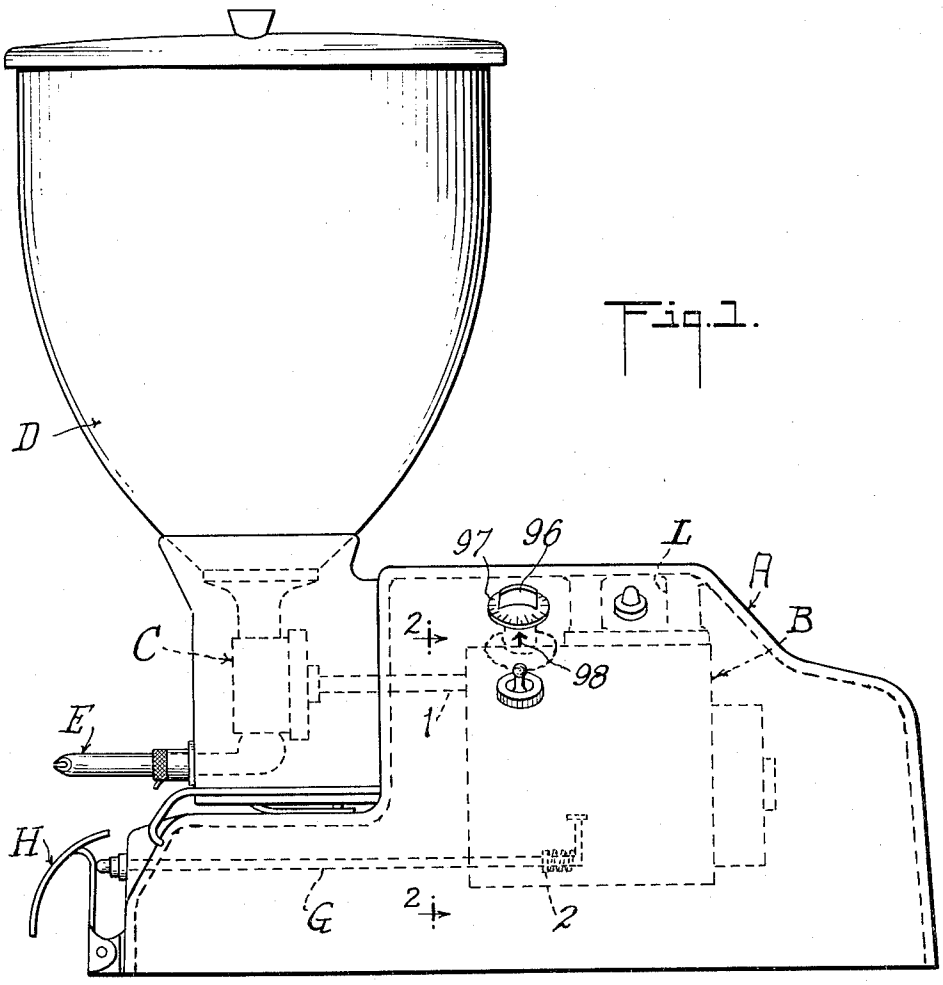


Fig. 1.

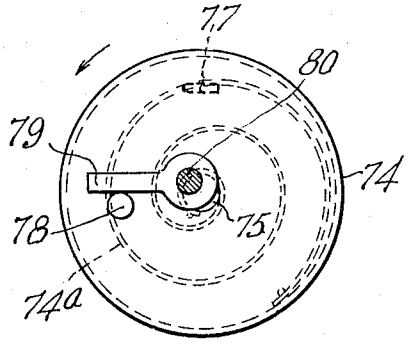


Fig. 13.

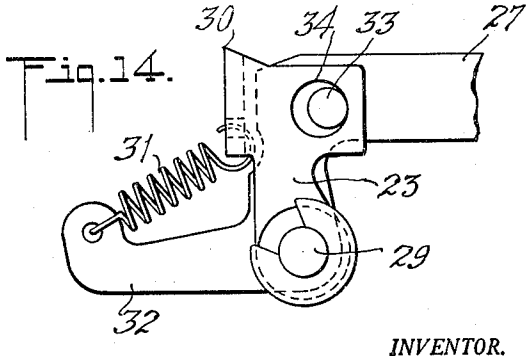


Fig. 14.

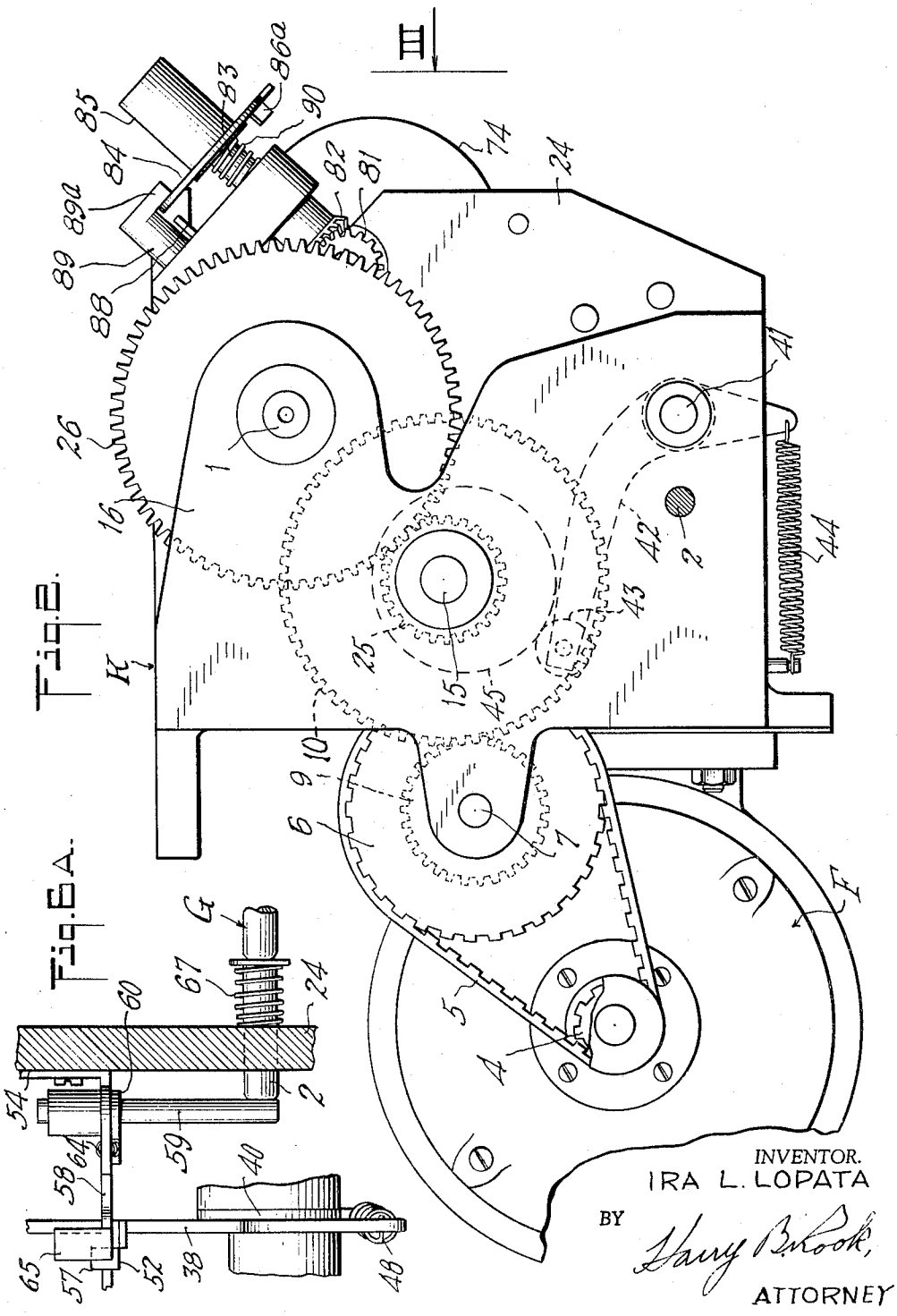
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Fig. 3.

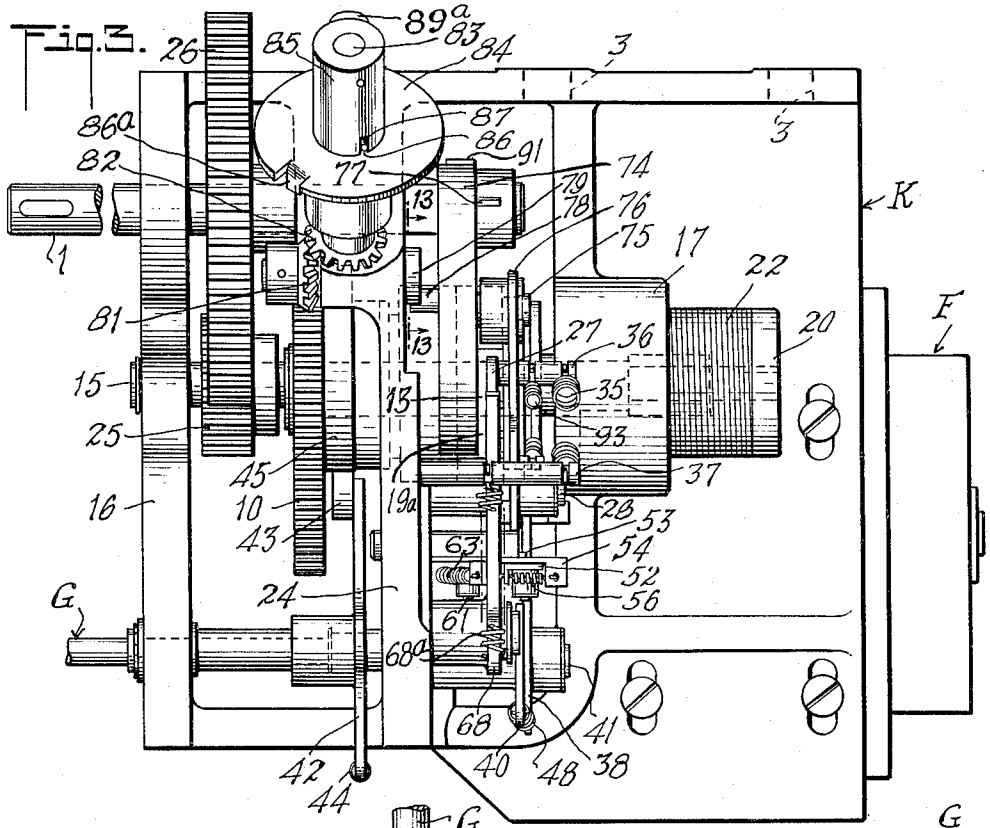


Fig. 6.

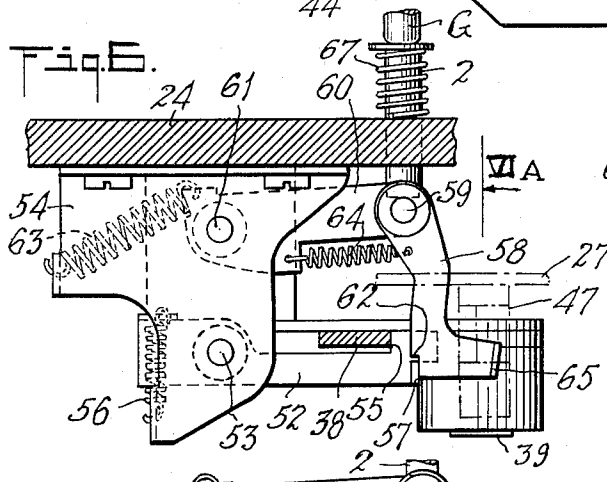


Fig. 7

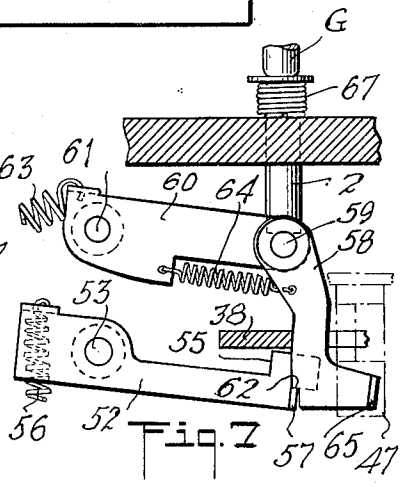
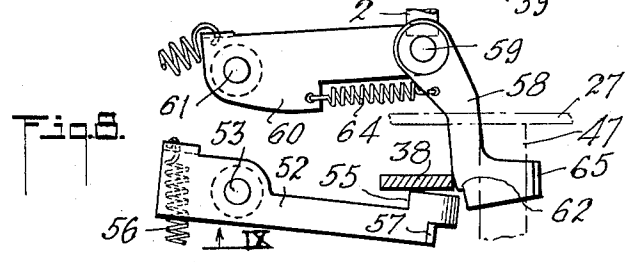


Fig. 8.



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Fig. 4.

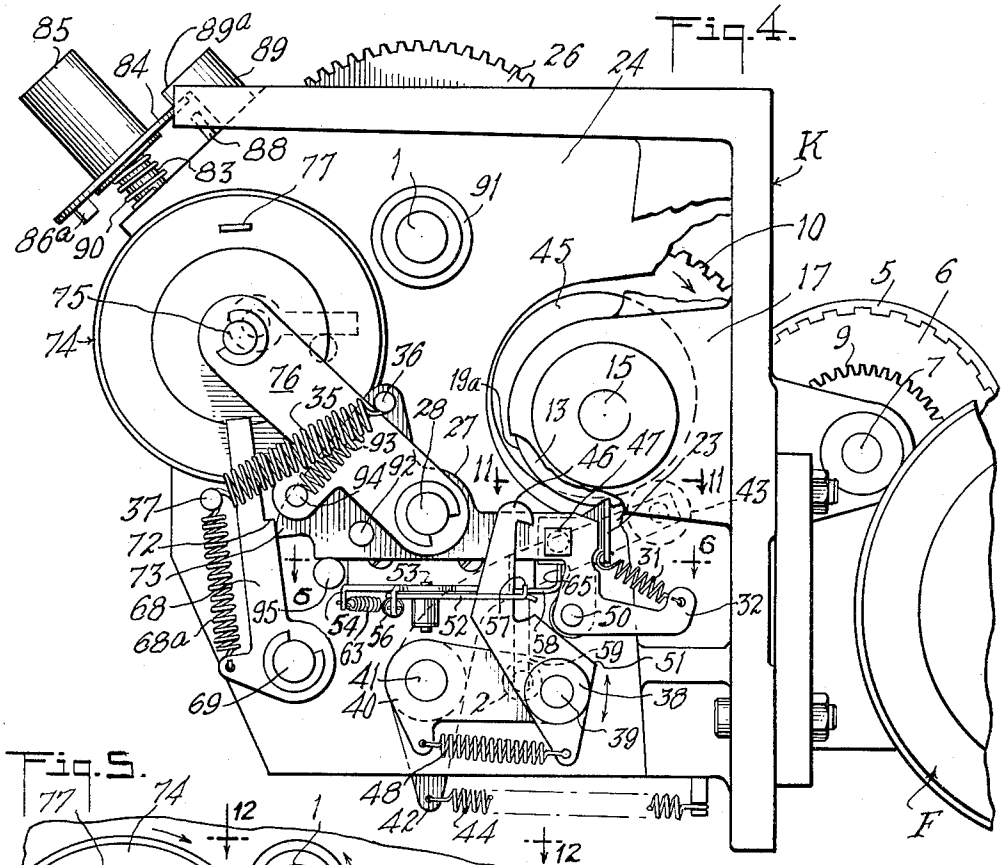
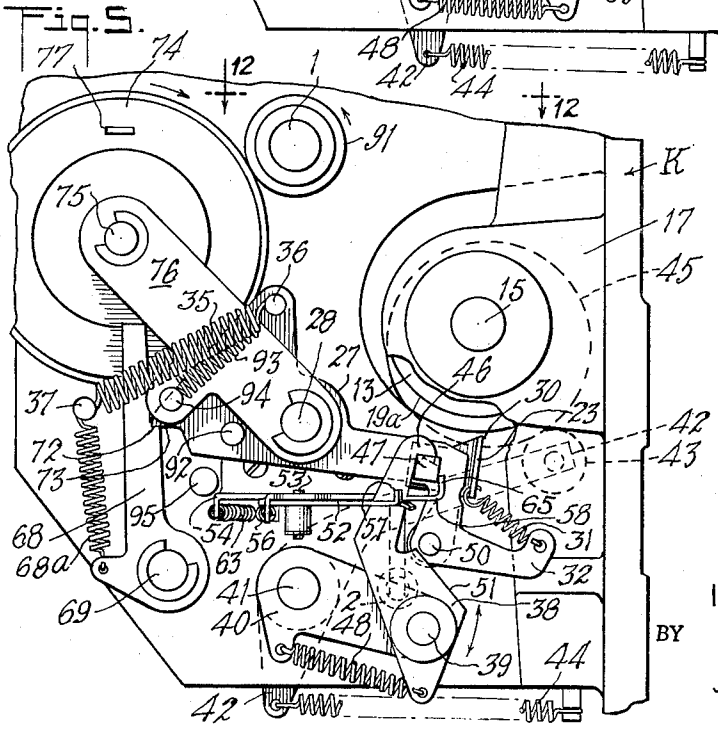


Fig. 5.



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Fig. 9.

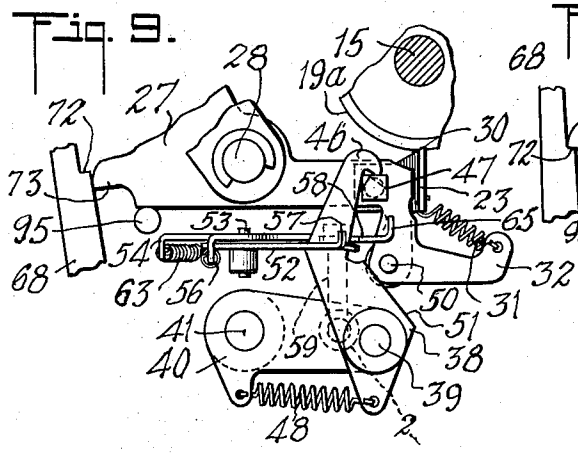


Fig. 10.

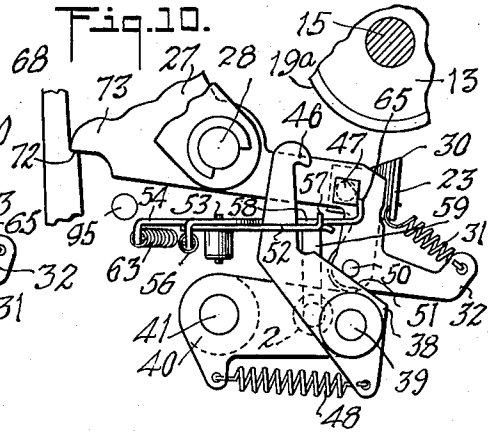


Fig. 11.

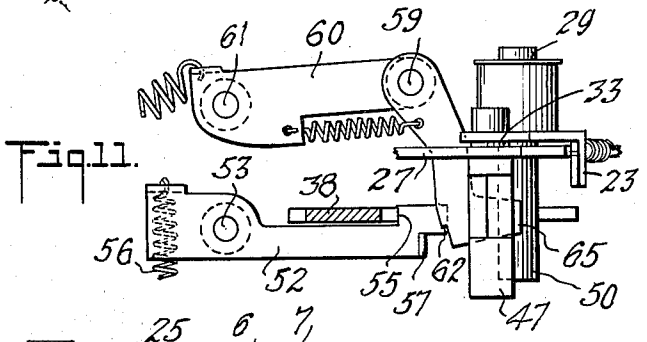


Fig. 12.

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United States Patent Office 3,002,599 Patented Oct. 3, 1961

3,002,599

INFINITELY AND POSITIVELY ADJUSTABLE METERING DRIVING MECHANISM

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Filed Dec. 2, 1959, Ser. No. 856,689
12 Claims. (Cl. 192—148)

This invention relates in general to a driving and metering mechanism that may be utilized for various purposes such as for use with a doughnut, pastry or cake filler of the type that is described and claimed in my co-pending application Serial No. 817,796 filed on June 3, 1959, a conveyor table, rotary index feed, or a strip feed mechanism.

One object of the invention is to provide a combination of a driving, actuating or input element, a driven or actuated element, or output element and a novel and improved simple, reliable and inexpensive adjustable control or indexing mechanism, whereby in effect the actuation of the driven or actuated element, for example, the extent of movement, such as the number of revolutions and fractions of a revolution of a shaft, may be infinitely varied.

Further objects of the invention are to provide a novel and improved driving mechanism which can be adjusted to provide in effect infinite variations in the portions or fractions of a revolution, of the driven or output shaft, and, which when combined with proper gearing can provide for any desired number of complete revolutions of the shaft or distance of linear or reciprocating motion; and to provide in such mechanism novel and improved means which shall make possible repetitive operations including starting and positive stopping the movement of the driven element. Another object is to provide such a driving mechanism which shall include a clutch between the driving shaft and the driven shaft in combination with adjustable control mechanism for such clutch to effect connection of the driving shaft with the driven shaft and also to cause automatic, accurate and positive stopping of the driven shaft, for example within a one degree arc of revolution.

Still further objects of the invention are to provide control mechanism of the character described which shall include a novel and improved setting mechanism for association with for example, a control device for a clutch and which shall include a setting wheel having a portion to actuate the clutch control device, and means for rotating the setting wheel to its desired set position and including a holding device for said rotating means whereby the setting wheel can be rotated minute fractions of a revolution to the desired set position, to effect, for example, an infinitesimal fraction of a revolution of a shaft driven through said clutch; and to provide a novel and improved combination of means for rotating the setting wheel and holding means for locking the rotating means in the desired set position.

It is another object to provide a control mechanism of this character which shall include a setting wheel driven by and synchronously with the output shaft, gearing and a clutch between the input shaft and the output shaft, a stop device coactive with said clutch normally to prevent rotation of the output shaft by the input shaft, a continuously operated clutch-releasing element, a latch associated with said clutch-stop mechanism and actuated by said setting wheel for causing actuation of the clutch-stop mechanism into stopping engagement with the clutch, and a starting trigger assembly for controlling engagement of said clutch-releasing element with the clutch-stop mechanism for actuating the latter out of engagement with the clutch to permit rotation of the output shaft by the input shaft.

Other objects, advantages and results of the invention will be brought out by the following description in conjunction with the accompanying drawings wherein

FIGURE 1 is a side elevation of a doughnut, pastry or cake filler like that disclosed in my co-pending application Serial No. 817,796 and including an infinitely adjustable driving and stop mechanism embodying the present invention;

FIGURE 2 is a greatly enlarged side elevation of the driving and stop mechanism removed from the casing of the machine shown in FIGURE 1;

FIGURE 3 is a front elevation of the driving mechanism viewed from the plane of the line III in FIGURE 2;

FIGURE 4 is an elevation of the side of the driving mechanism opposite that shown in FIGURE 2, with portions broken away and showing the clutch held by the trip mechanism with the output shaft at rest;

FIGURE 5 is a similar view showing the clutch released by the trip mechanism and the output shaft in operation;

FIGURE 6 is an enlarged fragmentary horizontal sectional view approximately on the plane of the line 6—6 of FIGURE 4, showing the starting mechanism in normal or rest position;

FIGURE 6A is a fragmentary elevation of a portion of the starting mechanism viewed from the line VI*a* of FIGURE 6;

FIGURE 7 is a similar view showing the operation of the starting mechanism to initiate operation of the driven or output shaft;

FIGURE 8 is a similar view showing the return movement of the starting mechanism to its normal position;

FIGURE 9 is a fragmentary view similar to FIGURE 5 showing the first step in the movement of the parts from the normal rest position shown in FIGURE 4 to the position shown in FIGURE 5;

FIGURE 10 is a similar view showing the parts in the next successive position;

FIGURE 11 is a horizontal sectional view approximately on the plane of the line 11—11 of FIGURE 4;

FIGURE 12 is a fragmentary horizontal sectional view approximately on the plane of the line 12—12 of FIGURE 5 with portions of the control mechanism omitted;

FIGURE 13 is a fragmentary sectional view approximately on the plane of the line 13—13 of FIGURE 3, showing the side of the setting wheel opposite that shown in FIGURES 4 and 5; and

FIGURE 14 is a greatly enlarged fragmentary elevational view of a portion of the clutch control lever and clutch pawl or shoe, viewing the same from the side opposite that shown in FIGURES 4 and 9.

As hereinbefore indicated, while the invention is susceptible to various uses, it has been shown as embodied in a doughnut, pastry or cake filling machine as shown in my co-pending application.

Specifically describing the illustrated embodiment of the invention, the machine comprises a main frame or base A that is in the form of a hollow shell with an open bottom and having mounted thereon the infinitely adjustable driving mechanism B that embodies the present invention, for a pump unit C which is adapted to transferring filling material from a receptacle or bowl D to one or more filling nozzles E. The pump unit C is driven by the driven or output shaft 1 of the mechanism B that is shown as including an electric motor F power from which is transmitted to the output shaft 1, starting of the driving mechanism being shown as manually controlled through a push-rod G slidably mounted in the base A and engaged at one end by a hand-operated lever H and

abutting at its other end an element 2 that forms a part of the starting device for the driving mechanism.

Now referring more particularly to the driving mechanism of the invention, the reference character K generally designates a cast iron frame or support that is secured by lugs or bosses L on the casing or base A by bolts (not shown) passing through holes 3 in the frame. On one side of the frame is mounted the electric motor F which has a pulley 4 on its shaft connected by a belt 5 to a pulley 6 that is journalled on an input shaft 7 in bracket arms 8 formed integrally with the cast base K.

Fast connected to the input shaft 7 is a pinion 9 which meshes with a gear 10 that is keyed on a sleeve 11 on which is also keyed a part 12 of a main clutch L another part 13 of which is rigidly connected as by a pin 14 to a clutch shaft 15 that is journaled in bearing brackets 16 and 17 that are integral parts of the frame K, the pin 14 being inserted into aligned openings in the shaft 15 and the part 13. Another part of the main clutch comprises a helical spring 18 one end of which is connected to the part 13 while the other end is connected to a sleeve 19 that encircles the parts 12, 13 and spring 18 and is rotatably relative thereto in one direction. The sleeve 19 has a peripheral tough resilient friction surface 19*a* such as rubber, that serves as a ratchet. Coacting with said ratchet surface 19*a* is a pawl or shoe 23 that is moved into and out of engagement with said surface by adjustable control mechanism to be later described. To prevent overrunning of the clutch shaft 15 and to insure a positive stop thereof, one end of the sleeve 19 has a notch 19*b* into which extends one end of the pin 14 for abutment with the side walls of the slot. A back-stop clutch has one part 20 pinned or otherwise rigidly connected to the shaft 15, another part 21 fast connected to the bearing 17, and a helical spring 22 that encircles and is connected to both of the parts 20 and 21.

Both clutches are of generally known construction and are associated with each other, the clutch shaft 15 and the pawl 23 so that when the sleeve 19 is held by the pawl against rotation as shown in FIGURE 4, the spring 18 permits free rotation of the gear 10 in one direction about the shaft 15, as indicated by the arrow, while when said sleeve is released the spring will cause the two parts of the main clutch and the shaft 15 to rotate together in the same direction. In all cases, the back-stop clutch prevents rotation of the shaft in the opposite direction.

The invention provides an adjustably controlled driving mechanism for transmitting motion from the clutch shaft 15 to the driven or output shaft 1 that is also journaled in bearing brackets 16 and 24 of the cast base A, whereby the number of revolutions and fractions of a revolution of said output shaft may be accurately and infinitely varied. As shown, a pinion 25 is fast connected to the clutch shaft 15 and meshes with a gear 26 on the output shaft 1. It will be understood that the gear ratios may be varied or changed according to the purposes for which the driving mechanism is intended, so as to provide for the desired maximum number of revolutions of the output shaft 1, and the invention includes control mechanism for the main clutch L associated with a setting mechanism whereby the number of revolutions of the shaft and any desired and infinitesimal fraction of a revolution of a shaft can be obtained.

The clutch control mechanism includes a stop device comprising a lever 27 pivotally mounted intermediate its ends on a stud 28 secured in the bracket 24 of the base A. At one end of the lever is mounted the pawl or shoe 23 that coacts with the surface 19*a* of the clutch The pawl 23 is preferably spring biased to provide smooth and positive operation without chatter, and is shown as pivotally mounted at one end on a stud 29 secured in the lever 27 and provided at its other end with a tooth 30 to engage the friction surface 19*a* of the sleeve 19. A tension spring 31 is connected between an extension 32 of the lever 27 and the pawl 23 to bias the pawl against a stop stud 33 secured in the lever and disposed in an opening 34 in the pawl. The stop lever 27 is normally biased by a tension spring 35 to swing the lever 27 in the direction to cause engagement of the pawl with the sleeve as shown in FIGURE 4, the spring being connected by the stud 36 on the lever and another stud 37 on the bracket 24. The lever 27 is normally urged by the spring 35 to hold the pawl in engagement with the sleeve, but under control of a starting or trigger assembly is actuated by a clutch-releasing element 38 to move the pawl out of engagement with the ratchet as shown in FIGURE 5.

The clutch-releasing element 38 is continuously reciprocated during operation of the driving mechanism and at the desired time is triggered into engagement with the clutch-stop lever 27. As shown, the element 38 is pivotally mounted intermediate its ends on a stud 39 carried by a crank 40 that is mounted on a shaft 41 that is journaled in the brackets 16 and 24 and has rigidly connected thereto a cam follower lever 42 whose follower roller 43 is held by a spring 44 in engagement with a cam 45 which is keyed on the sleeve 11 mounted on the clutch shaft 15 so that while the motor F is running, the shaft 41 will be oscillated by the follower lever and thus, through the crank 40 reciprocate the clutch-releasing element 38. The clutch-releasing element has a hook 46 at one end coactive with a rigid stud 47 on the clutch-stop lever 27 so that when the hook 46 is engaged with said stud, the lever 27 will be swung to disengage the pawl 23 from the sleeve 19 as shown in FIGURES 4 and 5. The clutch-releasing element 38 is normally biased by a spring 48 toward a position to engage the stud 47, but is normally held against such movement and out of line with the stud, as shown in FIGURE 4, by the starting or trigger assembly. The clutch-releasing element is pushed in the opposite direction away from said stud and into proper engagement with the trigger assembly by engagement of a stud 50 on the lever 27 with an inclined or cammed surface 51 on the element 38 when the lever 27 is in clutch-releasing position (FIGURES 5 and 10) and the element 38 is moved upwardly from the position shown in FIGURE 5 to the position shown in FIGURE 10.

This trigger assembly is shown as comprising a detent lever 52 pivotally mounted at 53 on a bracket plate 54 that is secured on the bracket 24 of the base. Adjacent one end and at one side thereof the detent lever 52 has a shoulder 55 normally abutted by the clutch-releasing element 38 as shown in FIGURES 4 and 5 so that the clutch-releasing element is held with its hook 46 out of line with the stud 47 on the clutch stop lever 27. The detent lever 52 is normally biased by a spring 56 toward the element 38 and has an upstanding lug 57 with which coacts a trigger lever 58 that is pivotally connected at 59 to one end of a carrier lever 60 the other end of which is pivotally connected at 61 to bracket plate 54. The trigger lever 58 has a shoulder 62 normally disposed in abutting relation with the lug 57 of the detent lever as best shown in FIGURE 6, and the carrier lever 60 is biased by a spring 63 while the trigger lever 58 is biased by a spring 64, to normally actuate the trigger lever into its normal or rest position shown in FIGURE 6. The pivot rod 59 that connects the trigger lever 58 to the carrier lever 60 extends beyond the pivotal connection of said levers as best shown in FIGURE 6A and is abutted by the starting element 2 that is shown in the form of a short rod slidably mounted in the bracket 24 and normally urged away from the rod 59 by a compression spring 67 and into abutting contact with suitable means that might be automatic for pushing the starting element against the rod, 59 but which is shown as the push rod G shown in FIGURE 1.

During operation of the machine, the trigger assembly, the clutch-stop lever 27, and the clutch-releasing element

38 are in the relative positions shown in FIGURE 4 with the clutch pawl holding the clutch sleeve against rotation and the element 38 continuously reciprocating. During this portion of the operation of the machine, the output shaft is at rest or stationary. When it is desired to start the output shaft, the push rod G is pushed, for example, by a hand lever H to in turn push the starting element 2 and thus move the trigger lever 58 and thereby swing the detent lever 52 from the position shown in FIGURE 6 to the position shown in FIGURE 7 so that the clutch-releasing element is released by swinging movement into line with the stud 47 on the clutch-stop lever, and then on a subsequent downward movement of the said element the hook 46 thereof will engage the stud 47 to cause the clutch-stop lever 27 to be swung downwardly and thereby disengage the pawl from the sleeve 19 as shown in FIGURE 4, whereupon the clutch sleeve is released and rotation of the output shaft is started through the clutch and the gear train 9, 10, 25 and 26. The clutch-stop lever 27 will be held in this position by a latch 68 until the latter is released by the setting mechanism and the rotation of the output shaft will continue until the clutch-stop lever is released by the actuation of the latch 68 by the setting mechanism for re-engagement of the clutch pawl with the sleeve 19. The latch 68 is pivoted at one end on a stud 69 on the bracket 24 of the base and has a shoulder 70 intermediate its ends to underlie a nose 73 on the clutch-stop lever for holding the latter in clutch-releasing position as shown in FIGURE 5, there being a spring 68*a* urging the lever 68 to said nose.

As stated above, in accordance with the invention, the number of revolutions of the output shaft and any desired fraction of a revolution, even infinitesimal, is determined by the setting mechanism that includes a setting wheel 74 journaled on a stud shaft 75 at one end of a setting lever 76 the other end of which is pivotally connected to the stud 28 coaxially with the pivot of the clutch-stop lever 27, said setting wheel having a lug 77 projecting laterally therefrom to engage and actuate the latch 68 out of holding engagement with the clutch-stop lever 27. The setting wheel is shown as being cup-shaped and having a spiral spring 74*a* that normally tends to rotate the wheel in the direction of the arrow in FIGURE 13 to cause contact of a stud 78 on the wheel with a setting finger 79 that is rigidly carried by a stub shaft 80 journaled in the bracket 24 and also having fast connected thereto a pinion 81 that meshes with another pinion 82 which is fast connected to a setting shaft 83 also journaled in the bracket 24 and on which is mounted a setting and holding disc 84 for longitudinal movement on the shaft and rotation therewith. As shown, the disc has a hub 85 provided with diametral slots 86 in which is disposed a pin 87 that is fixed in the shaft. The disc 84 has a stop finger 86*a* to abut a stop pin 88 on the bracket 24 for limiting the rotation of the disc in both directions, and cooperating with the disc is a holding post 89 rigidly projecting from the bracket 24 and having a finger 89*a* overhanging and normally frictionally engaged by the setting disc when the disc is in one position of the shaft 83 whereby the disc is held against rotation. The disc is normally actuated into that position by a spring 90 interposed between the bracket 24 and the disc, such movement of the disc being limited by engagement of the disc with the pin 87; and the disc can be disengaged from the finger for adjustment, by simply pressing the disc against the influence of the spring 90.

With this construction it will be observed that the setting wheel will normally be held in predetermined position by the spring 74*a* with the stud 78 abutting the setting finger 79, and when it is desired to rotate the setting wheel, the disc 84 is pressed and held against the spring 90 to disengage the periphery of the disc from the holding stud, and at the same time the disc and shaft 83 are rotated so that through the pinions 81 and 82 the setting wheel is rotated so as to adjust the position of the lug 77 with respect to the latch 68. Upon release of the setting disc, its periphery will be re-engaged with the holding stud so as to hold the setting wheel in the set position. In this connection, it will be noted that the wheel may be rotated almost infinite fractions of a revolution so that the lug can be finely adjusted with respect to the latch. The setting wheel is rotated in the direction of the arrow in FIGURE 5 synchronously with the output shaft to cause engagement of the lug 77 with the latch and obviously the distance of travel from the set position of the lug to the position at which it engages and actuates the latch predetermines the extent of rotation of the output shaft. The setting wheel is driven by the output shaft, and its periphery may have a friction-producing surface in contact with the peripheral surface of a driving element 91 fast connected to the output shaft 1; and the setting wheel is moved into and out of engagement with an element 91 by movement of the clutch-stop lever 27, the setting lever being held against the stud 36 by a spring 93 connected between the stud 36 and a stud 94 on the setting lever. The spring 93 also permits movement of the clutch-stop lever under the influence of the clutch-releasing element 38 after the setting wheel has engaged the element 91 so as to insure both upper engagement of the nose 73 of the clutch-stop lever with the shoulder 72 of the latch and proper driving engagement of the setting wheel with the driving element 91. It will be obvious that the setting wheel will be moved out of engagement with the element 91 upon disengagement of the latch lever 68 from the clutch-stop lever and by the spring 35, movement of the clutch-stop lever under the influence of the spring 35 being limited by a stop stud 95.

In operation, the movement of the clutch-stop lever by the clutch-releasing element 38 to disengage the clutch pawl from the clutch sleeve surface 19*a*, so as to start rotation of the output shaft, also causes driving engagement of the setting wheel with the element 91 to cause rotation of the setting wheel and eventual engagement of the lug 77 with the latch lever 68 after a number of revolutions and a fraction of a revolution predetermined by the setting of the setting wheel and thereby release the clutch-stop lever for re-engagement of the pawl with the clutch sleeve and consequent instantaneous and positive stopping of the output shaft and simultaneous disengagement of the setting wheel from the element 91.

Other means than the bevel gearing 81, 82 and the holding disc 84 and post 89 can be utilized for setting and holding the setting wheel or metering drum 74; for example a worm and worm gear could be used in place of the bevel gears. Also if desired a vernier scale may be provided to more accurately determine the position of the setting wheel. It will be noted further that the setting wheel is in effect a metering drum.

As hereinabove indicated, the ratio of the gearing may be changed to suit the particular purpose for which the mechanism is to be used, and it should also be understood that the number of teeth in the ratchet 19 may also be varied to suit the conditions under which the mechanism is to be operated.

If desired a knob 96 may be connected to the hub 85 of the setting disc 84 and having a suitable graduated dial 97 to cooperate with a pointer 98 on some part of the machine, shown in the present instance on the casing A of the doughnut filling machine.

While the driving mechanism has been shown in connection with a doughnut, pastry or cake filling machine, as hereinbefore indicated, the inventor contemplates the utilization of the mechanism for many other purposes, for example in indexing mechanisms, feed table devices, limit switch operators and door closers. Furthermore, while the invention has been shown as embodied in certain structural details, it will be understood that this is primarily for the purpose of illustrating the principles of the invention and that many modifications and changes

can be made in the construction of the mechanism within the spirit and scope of the invention.

I claim:

1. An adjustable driving and positive stop mechanism, including a frame, an input shaft and an output shaft journaled thereon, gearing including a clutch drivingly connecting said shafts, a clutch-stop device coactive with said clutch normally to stop the clutch and prevent rotation of said output shaft by the input shaft, a clutch-releasing element engageable with and disengageable from said clutch-stop device to release the clutch for operation of said output shaft and to stop said clutch and thereby stop said output shaft, respectively, a latch associated with said clutch-stop device to hold the latter in position to release the clutch, and a setting device to actuate said latch for release of said clutch-stop device to stop the clutch and said output shaft, said setting device including a wheel drivable by said output shaft and movable into and out of driven relation to said shaft upon movement of the clutch-stop device into clutch-releasing and clutch-stopping positions, respectively.

2. An adjustable driving and positive stop mechanism as defined in claim 1 wherein said clutch-stop device includes a lever pivotally mounted intermediate its ends on said frame with its ends separably engageable with said clutch and said latch respectively, and with the addition of a driving element rotatable with said output shaft to be drivingly engaged by said setting wheel, a lever pivotally mounted at one end coaxially with said clutch-stop lever and having said setting wheel journaled on its other end, and a yieldable connection between said levers whereby said setting wheel is moved into and out of driving engagement with said driving element upon movement of said clutch-stop lever in opposite directions into clutch-releasing and clutch-stopping positions, respectively.

3. An adjustable driving and positive stop mechanism, including a frame, an input shaft and an output shaft journaled thereon, gearing including a clutch drivingly connecting said shafts, a clutch-stop device coactive with said clutch normally to stop the clutch and prevent rotation of said output shaft by the input shaft, a clutch-releasing element engageable with and disengageable from said clutch-stop device to release the clutch for operation of said output shaft and to stop said clutch and thereby stop said output shaft, respectively, a latch associated with said clutch-stop device to hold the latter in position to release the clutch, and a setting device to actuate said latch for release of said clutch-stop device to stop the clutch and said output shaft, said clutch-stop device including a lever pivotally mounted intermediate its ends on said frame with its ends separably engageable with said clutch and said latch, respectively, said clutch-releasing element and said clutch-stop lever having coactive releasably interlockable parts, said clutch-releasing element being reciprocable and engageable with and releasable from said clutch-stop lever upon movement in opposite directions, respectively, and starting trigger mechanism normally holding said clutch-releasing element in non-engageable relation to the clutch-stop lever and operable to cause engagement of said clutch-releasing element with said clutch-stop lever.

4. An adjustable driving and positive stop mechanism as defined in claim 3 wherein said clutch-releasing element and said clutch-stop lever have coacting portions to actuate said clutch-releasing element into said non-engageable relation to the clutch-stop lever upon movement of the clutch-releasing element in one direction and while said clutch-stop lever is in clutch-releasing position.

5. An adjustable driving and positive stop mechanism, including a frame, an input shaft and an output shaft journaled thereon, gearing including a clutch drivingly connecting said shafts, a clutch-stop device coactive with said clutch normally to stop the clutch and prevent rotation of said output shaft by the input shaft, a clutch-releasing element engageable with and disengageable from said clutch-stop device to release the clutch for operation of said output shaft and to stop said clutch and thereby stop said output shaft, respectively, a latch associated with said clutch-stop device to hold the latter in position to release the clutch, and a setting device to actuate said latch for release of said clutch-stop device to stop the clutch and said output shaft comprising a wheel drivable by said output shaft and movable into and out of driven relation to said shaft upon movement of the clutch-stop device into clutch-releasing and clutch-stopping positions, respectively, said clutch-stop device comprising a lever pivotally mounted intermediate its ends on said frame with its ends separably engageable with said clutch and said latch respectively, said clutch-releasing element and said clutch-stop lever having coactive releasably interlockable parts, said clutch-releasing element being reciprocable and engageable with and releasable from said clutch-stop lever upon movement in opposite directions respectively, a starting trigger mechanism normally holding said clutch-releasing element into non-engageable relation to the clutch-stop lever and operable to cause engagement of said clutch-releasing element with said clutch-stop lever, a driving element releasable with said output shaft to be drivingly engaged by said setting wheel, a lever pivotally mounted at one end coaxially with said clutch-stop lever and having said setting wheel journaled on its other end, and a yieldable connection between said levers whereby said setting wheel is moved into and out of driving engagement with said driving element upon movement of said clutch-stop lever in opposite directions into clutch-releasing and clutch-stopping positions, respectively.

6. An adjustable driving and positive stop mechanism as defined in claim 5 wherein said clutch-releasing element and said clutch-stop lever have coacting portions to actuate said clutch-releasing element into said non-engageable relation to the clutch-stop lever upon movement of the clutch-releasing element in one direction and while said clutch-stop lever in is clutch-releasing position.

7. An adjustable driving and positive stop mechanism as defined in claim 3 with the addition of means for reciprocating said clutch-releasing element comprising a crank pivotally mounted at one end on said frame and having the clutch-releasing element pivotally connected to its other end, a rotatable cam journaled on said frame and driven by said input shaft, and a follower lever for said cam connected to said crank for oscillating the latter to reciprocate said clutch-releasing element.

8. An adjustable driving and positive stop mechanism, including a frame, an input shaft and an output shaft journaled thereon, gearing including a clutch drivingly connecting said shafts, a clutch-stop device coactive with said clutch normally to stop the clutch and prevent rotation of said output shaft by the input shaft, a clutch-releasing element engageable with and disengageable from said clutch-stop device to release the clutch for operation of said output shaft and to stop said clutch and thereby stop said output shaft, respectively, a latch associated with said clutch-stop device to hold the latter in position to release the clutch, and a setting device to actuate said latch for release of said clutch-stop device to stop the clutch and said output shaft, said clutch-stop device including a lever pivotally mounted intermediate its ends on said frame with its ends separably engageable with said clutch and said latch, respectively, said clutch-releasing element and said clutch-stop lever having coactive releasably interlockable parts, said clutch-releasing element being reciprocable and engageable with and releasable from said clutch-stop lever upon movement in opposite directions, respectively, and starting trigger mechanism normally holding said clutch-releasing element in non-engageable relation to the clutch-stop lever and operable to cause engagement of said clutch-releasing element with said clutch-stop lever, said starting trigger mechanism including a detent lever pivotally mounted on said frame and having a shoulder normally engageable by

said clutch-releasing element, a trigger lever reciprocably mounted on said frame, said detent lever and said trigger lever having coacting abuttingly engaging parts providing for swinging of said detent lever out of engagement with the clutch-releasing element upon movement of said trigger lever in one direction to cause engagement of the clutch-releasing element with the clutch-stop lever.

9. An adjustable driving and positive stop mechanism as defined in claim 8 wherein said detent lever and said trigger lever are biased into their normal abutting relationship and said trigger lever is provided with a projection momentarily engageable with the clutch-stop lever when the latter is in clutch-releasing position to prevent movement of said trigger lever and said detent lever into their said normal position until said clutch-stop lever is actuated into its clutch-stopping position.

10. An adjustable driving and positive stop mechanism, including a frame, an input shaft and an output shaft journaled thereon, gearing including a clutch drivingly connecting said shafts, a clutch-stop device coactive with said clutch normally to stop the clutch and prevent rotation of said output shaft by the input shaft, a clutch-releasing element engageable with and disengageable from said clutch-stop device to release the clutch for operation of said output shaft and to stop said clutch and thereby stop said output shaft, respectively, a latch associated with said clutch-stop device to hold the latter in position to release the clutch, and a setting device to actuate said latch for release of said clutch-stop device to stop the clutch and said output shaft, said setting device comprising a wheel drivable in timed relation to said output shaft and having a projection to engage and actuate said latch, and means for adjusting said wheel providing for infinite variations in the position of said projection with respect to said latch to thereby pre-determine the number of revolutions or fraction of a revolution of said output shaft.

11. An adjustable driving and positive stop mechanism, including a frame, an input shaft and an output shaft journaled theron, gearing including a clutch drivingly connecting said shafts, a clutch-stop device coactive with said clutch normally to stop the clutch and prevent rotation of said output shaft by the input shaft, a clutch-releasing element engageable with and disengageable from said clutch-stop device to release the clutch for operation of said output shaft and to stop said clutch and thereby stop said output shaft, respectively, a latch associated with said clutch-stop device to hold the latter in position to release the clutch, and a setting device to actuate said latch for release of said clutch-stop device to stop the clutch and said output shaft, said clutch including two relatively coaxially rotatable parts and an helical coaxial spring having one of its ends connected to each of said parts, and one of said parts having a circumferential ratchet surface, and said clutch-stop device including a pawl engageable with and disengageable from said ratchet surface to stop and release the clutch respectively.

12. An adjustable driving and positive stop mechanism including a frame, an input shaft and an output shaft journaled thereon, a clutch shaft journaled in said frame, a clutch including two relatively rotatable parts coaxial with said clutch shaft, one of which is fast connected to the shaft and the other of which is relatively rotatable to the shaft, and an helical coaxial spring having each end connected to one of said parts, a driving connection between said input shaft and the first-mentioned part of said clutch for rotating the latter, a driving connection between said clutch shaft and said output shaft, the other part of the clutch having a circumferential ratchet surface, a clutch-stop device having a pawl coactive with said ratchet normally to stop the clutch and prevent rotation of said output shaft by the input shaft, a clutch-releasing element engageable with the disengageable from said clutch-stop device to release the clutch for operation of said output shaft and to stop said clutch and thereby stop said output shaft, respectively, a latch associated with said clutch-stop device to hold the latter in such position to release the clutch, and a setting device to actuate said latch for release of said clutch-stop device to stop the clutch and said output shaft, said clutch-stop device including a lever pivotally mounted intermediate its ends on said frame having said pawl at one end and coactive with said latch at its other end, said setting device including a wheel drivable in timed relation to said output shaft and having a projection to engage and actuate said latch, a lever pivotally mounted at one end coaxial with said clutch-stop lever and having said setting wheel journaled at its other end, and a yieldable connection between said levers whereby said setting wheel is moved into and out of driving relation to said output shaft upon movement of said clutch-stop lever in opposite directions into clutch-releasing and clutch-stopping positions, respectively.

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