Aug. 22, 1950 R. A. DOHL ET AL 2,519,894

SPEED CONTROLLING MECHANISM FOR MAIL TREATING MACHINES

Filed June 12, 1946 3 Sheets-Sheet 1

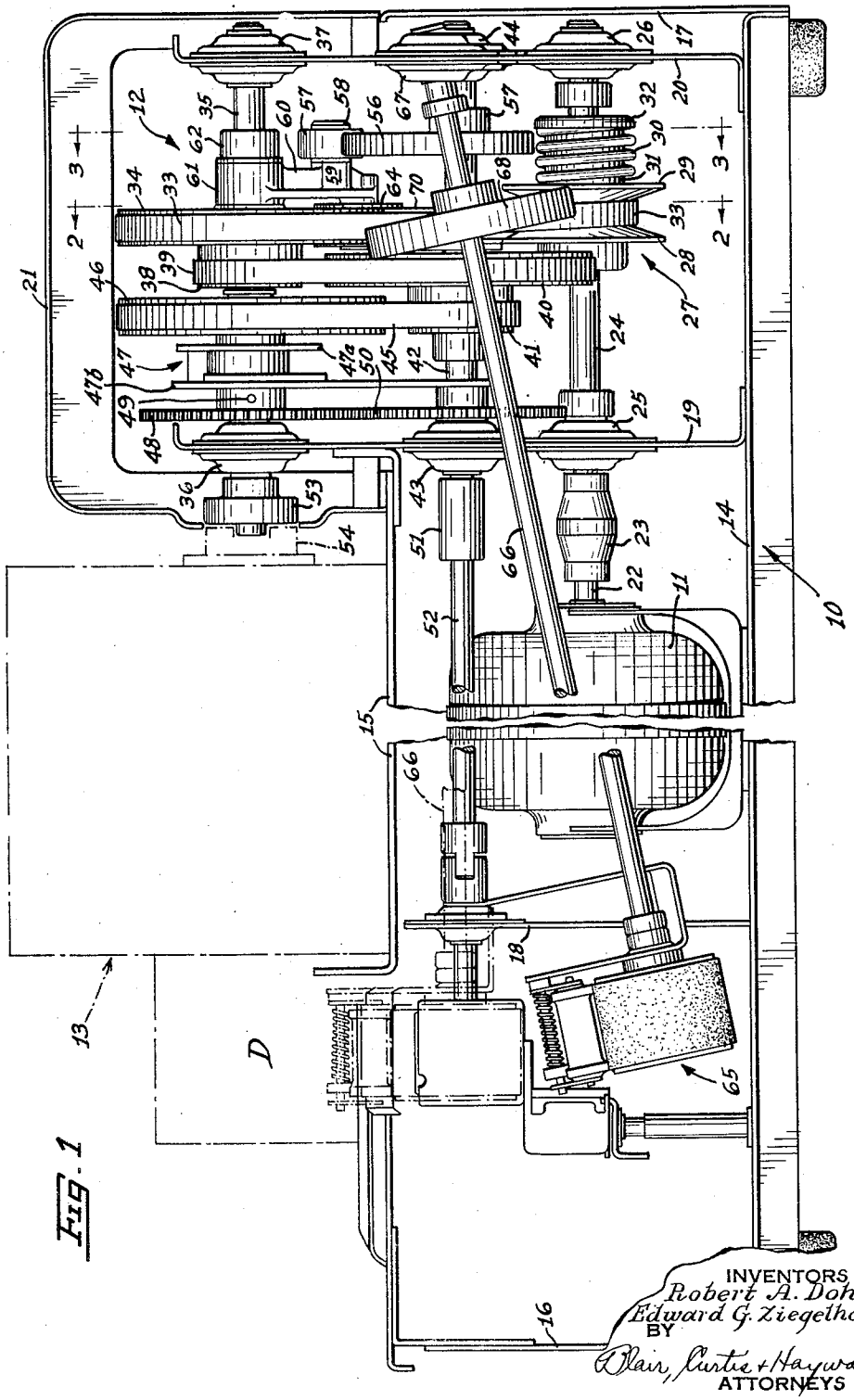


FIG. 1

INVENTORS
Robert A. Dohl
Edward G. Ziegelhoefer
BY
Blair, Curtis & Hayward
ATTORNEYS

Aug. 22, 1950 R. A. DOHL ET AL 2,519,894

SPEED CONTROLLING MECHANISM FOR MAIL TREATING MACHINES

Filed June 12, 1946 3 Sheets-Sheet 2

Fig. 2

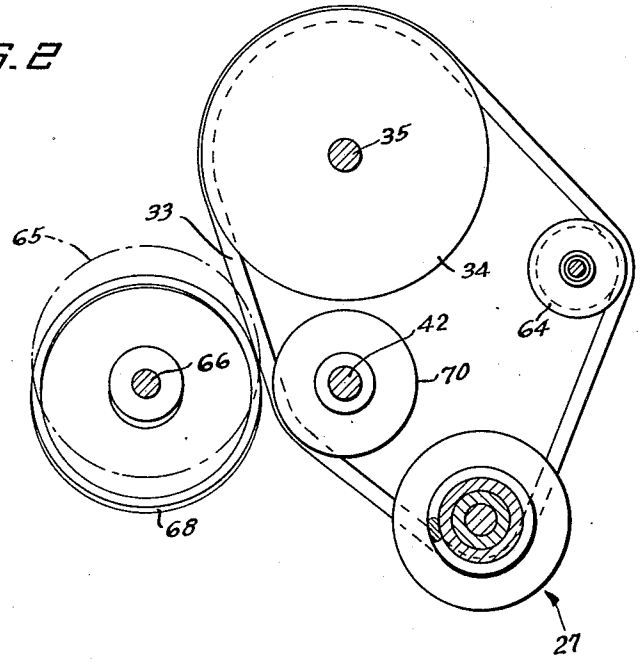
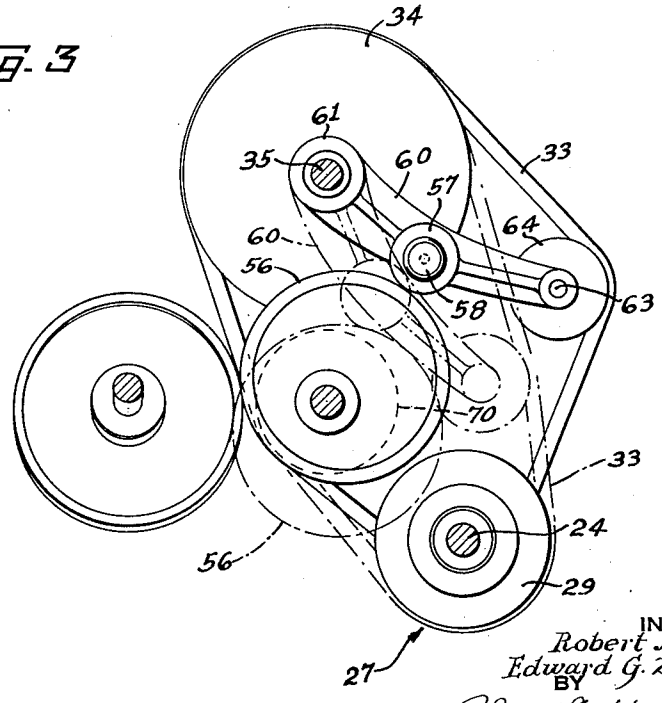


Fig. 3



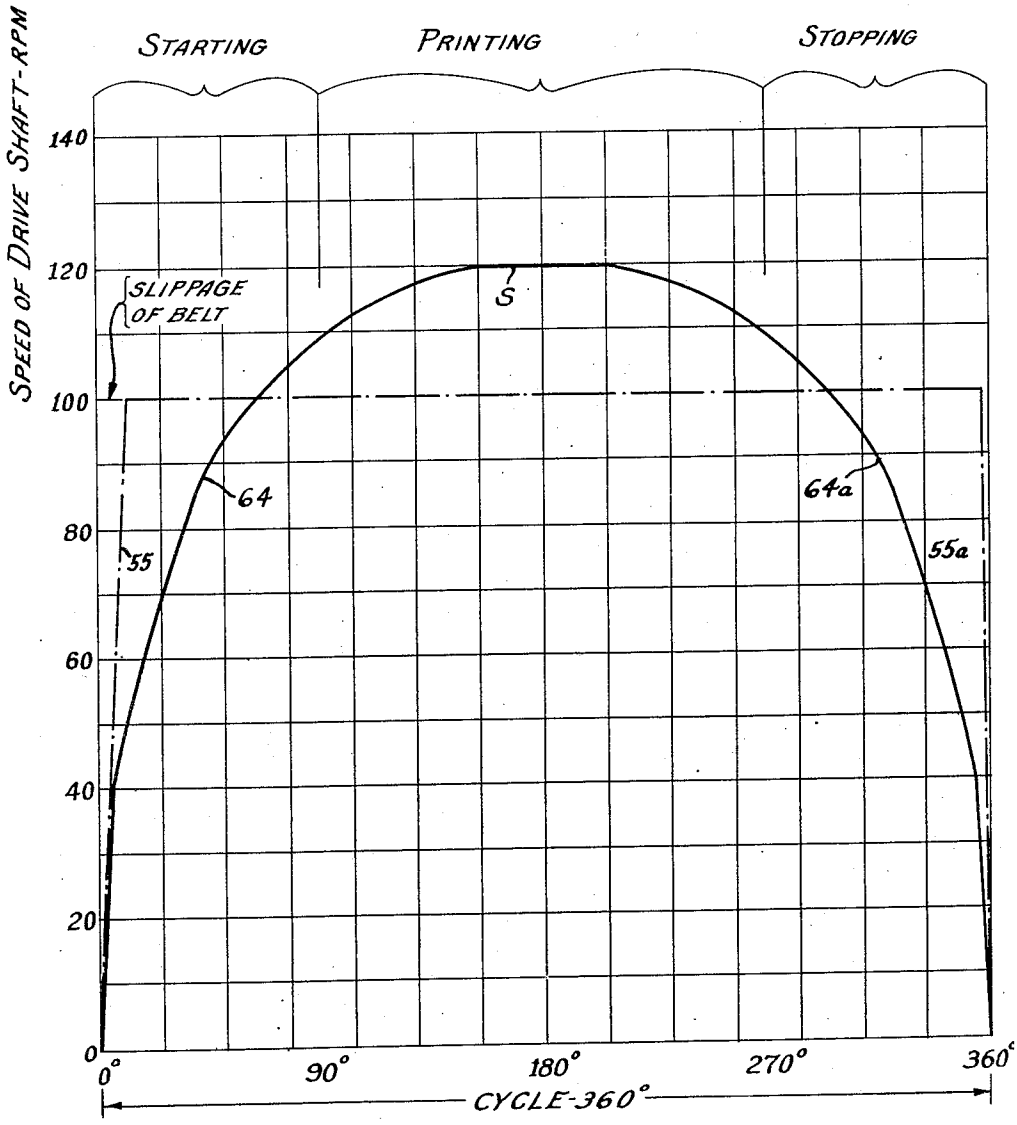
INVENTORS
Robert A. Dohl
Edward G. Ziegelhoefer
BY
Blair, Curtis + Hayward
ATTORNEYS

Aug. 22, 1950 R. A. DOHL ET AL 2,519,894

SPEED CONTROLLING MECHANISM FOR MAIL TREATING MACHINES

Filed June 12, 1946 3 Sheets-Sheet 3

Fig. 4



INVENTORS
Robert A. Dohl
Edward G. Ziegelhoefer
BY
Blair, Curtis & Hayward
ATTORNEYS

Patented Aug. 22, 1950 2,519,894

UNITED STATES PATENT OFFICE

2,519,894

SPEED CONTROLLING MECHANISM FOR MAIL TREATING MACHINES

Robert A. Dohl and Edward G. Ziegelhoefer, Rochester, N. Y., assignors to Commercial Controls Corporation, a corporation of Delaware

Application June 12, 1946, Serial No. 676,328

5 Claims. (Cl. 101—235)

1

This invention relates to a mail treating machine, and more particularly to improvements in the driving mechanism of such a machine.

In order to be readily adaptable to the wide variety of mail matter normally transmitted from different types of business offices, a mail treating machine must be capable of handling envelopes and cards of varying lengths and widths in such manner that the postage values may be accurately and efficiently printed thereon without loss of postage, and must also be of such nature as to be capable of printing postage values on gummed tape. These machines are in most all instances characterized by a relatively heavy meter which is automatically and intermittently operated, in the case of a succession of envelopes or cards, to print postage values thereon in accordance with values set into the meter. When a postage value is to be printed on a strip of gummed tape, it is customary to actuate the machine, including the meter, manually. In either event, however, the meter operation is intermittent, rather than continuous, and as the mechanism of the meter is of necessity rugged, and in many cases of substantial weight, a substantial initial load is put upon the driving mechanism which actuates the meter, as well as on the electric motor, which in the case of an electrically operated machine is connected to the driving mechanism.

Such driving mechanism is, in many cases, characterized by a non-revolution clutch which is automatically or manually tripped in accordance with the type of mail matter going through the machine, and which accordingly is directly subjected to the very substantial starting load at the beginning of each cycle of operation, whether the remainder of the driving mechanism, including the motor, runs continuously or not. Thus, in the case where the motor and driving mechanism run continuously, the clutch will be automatically or manually engaged to transfer the driving impetus from the driving mechanism to the meter, and in many cases to the platen which underlies the meter printing drum. The sudden shock engendered upon engagement of the clutch must be absorbed by the clutch if the machine is to operate continuously in an efficient manner. It might be noted that in busy offices a substantial number of pieces of mail, for example up to ten thousand pieces per day, are handled by one machine. If then such a clutch is to be subjected to such usage day after day, it must be proportionately rugged. Even so, however, clutch failures under such conditions

2

of use are not uncommon, and too, the noise resulting from intermittent clutch engagement and disengagement is often objectionable.

Such machines also often include an envelope sealing and ejecting device which, when in operative position, lies in the path of travel of an envelope from the meter printing drum, the ejector being connected in any suitable manner to the driving mechanism, so as to be driven thereby at a suitable rate of speed to eject the envelope with sufficient rapidity that a following envelope will not come into engagement with it. When, however, the machine is set to print postage values on tape, such ejecting device is, of course, unnecessary, and desirably is completely removed from the path of travel of the tape, as not to impede the movement of the tape from the printing drum. This is particularly true when the tape is moistened as it leaves the machine. When such ejecting device is so removed from the path of tape travel, there is, of course, no need for driving it. However, in various types of mail treating machines that have been commercially available, the ejector is connected at all times to the driving mechanism, and accordingly operates whether in operative position or otherwise, thus adding to the complexity and accordingly cost and maintenance of the machine.

Accordingly it is among the objects of our invention to provide in a mail treating machine a driving mechanism capable of obviating the disadvantages hereinbefore described in a simple and efficient manner. Other objects will be in part apparent and in part pointed out hereinafter.

In accordance with one form of our invention, the machine includes an electric motor which, when the machine is in operation, is continuously running, and is adapted to be intermittently connected to the meter by way of the driving mechanism. The driving mechanism includes, in addition to an intermittently engageable one-revolution clutch, shafts, pulleys, and belts, between the motor and one side of the clutch, which are constantly driven with the motor. Associated with one of the driving belts in this mechanism is a cam and follower which operate upon engagement of the clutch in such manner as to effect, at the beginning of the cycle of operation, a relatively slow acceleration of the meter drive shaft, and a proportionate deceleration thereof at the end of the cycle, the arrangement being such that during the printing portion of the cycle the meter is driven at top speed. Thus the clutch is not subjected to a substantially full

load at the start of the cycle, nor must it abruptly absorb the full momentum of the driven mechanisms at the end of the cycle. Also associated with the driving mechanism is a friction disc connected to the drive shaft of the ejector device which is in driving connection with the driving mechanism only when the ejector is in operative position, the ejectors thus being stationary, i. e. not driven when in inoperative position.

The specific nature of the mechanism will be more readily understood by reference to the drawing wherein

Figure 1 is a fragmentary elevation of one end of the machine, showing the relationship of the motor, the meter, the interconnecting driving mechanism and the envelope ejecting device;

Figure 2 is a sectional elevation taken along the line 2—2 of Figure 1;

Figure 3 is a sectional elevation taken along the line 3—3 of Figure 1; and,

Figure 4 is a graph or plot of comparative acceleration and deceleration curves.

Similar reference characters refer to similar parts throughout the views of the drawing.

The machine shown in Figure 1 is generally of the type described in detail in Patent No. 2,350,703 to Commodore D. Ryan and Edward P. Drake, and in general comprises a housing, generally indicated at 10, in which is disposed a motor 11 connected to a driving mechanism, generally indicated at 12, adapted to drive a meter 13 for printing postage values on envelopes and cards, or on gummed tape. It will suffice here to note that operation of meter 13 may be effected automatically upon the introduction of an envelope or card in the machine, or manually by a suitable push button or lever (not shown) when it is desired to print postage on tape.

More secifically, housing 10 comprises bottom and top plates 14 and 15, the latter of which provides a platform for the support of meter 13, means (not shown) being provided for detachably securing the meter in operative position on the platform. Housing 10 also includes front and rear walls 16 and 17 between which are secured in any suitable manner supporting partitions or plates 18, 19 and 20. Plates 18 and 19 constitute a compartment within which motor 11 is disposed, while plates 19 and 20 form a chamber within which the driving mechanism 12 is disposed, the upper portion of this chamber being provided with a detachable cover or hood 21.

The armature shaft 22 of motor 11 has fastened to its outer end a coupling 23 which attaches the armature shaft to a shaft 24, the opposite ends of which are journaled in bearings 25 and 26 carried respectively in plates 19 and 20. On this shaft is fastened a pulley, generally indicated at 27, comprising a fixed side 28 and an axially movable side 29. Side 29 is spring-biased toward fixed side 28 by a spring 30 coiled about a pulley hub 31, one end of the spring bearing against a flange 32 on the free end of the hub, the other end of the spring bearing against the axially movable side 29 of pulley 27. About this pulley is trained a belt, e. g. a V belt 33, this belt also being trained about a larger pulley 34 rotatably mounted on a shaft 35, whose opposite ends are journaled in bearings 36 and 37 carried respectively by plates 19 and 20. Fixed to pulley 34 in any suitable manner, so as to rotate therewith relative to shaft 35, is a smaller pulley 38 over which is trained a second belt 39. Belt 39 is also trained about a large pulley 40, the hub of which may comprise a smaller pulley 41, pulleys 40 and 41 being freely rotatable on a shaft 42, the opposite ends of which are journaled in bearings 43 and 44 carried respectively by plates 10 and 20. Also freely mounted on shaft 42 is an idler pulley 70 (see also Figure 2) over which belt 33 runs.

Small pulley 41 has trained thereover a V belt 45, which is also carried by a large pulley 46 rotatably mounted on shaft 35 so as to be freely rotatable relative thereto. This pulley 46 is secured in any suitable manner to the driving element 47*a* of a one-revolution clutch, generally indicated at 47, the driven element 47*b* of which may be secured to the hub of a gear 48 which is fixed as by a pin 49 to shaft 35. If desired, clutch element 47*b* may also be directly secured to shaft 35. For a detailed description of the construction and operation of clutch 47, reference is made to the above-noted patent. Thus it follows that when clutch 47 is engaged, gear 48 as well as shaft 35 are driven by the several parts described intervening motor 11 and the clutch. In other words, when motor 11 is energized, pulleys 27, 34, 38, 40, 41 and 46, and clutch element 47*a* are constantly driven.

As described in detail in the above-noted Ryan et al. patent, clutch 47 may be engaged in either of two manners. Mechanism not herein shown may be provided to effect clutch engagement upon the introduction of a piece of mail such as an envelope or a card, or, when the machine is set for printing on tape, clutch engagement may be effected by a suitable push button or lever.

When clutch 47 is thus engaged so as to drive gear 48, a mesh gear 50 is also driven. This gear 50 is secured in any suitable manner to shaft 42, which shaft is secured as by a coupling 51 to a shaft 52, the outer end of which carries a platen (not shown) which underlies the printing drum D of meter 13 and comprises an underlying support for the envelope or tape during the printing operation. Shaft 35 carries on its left-hand end a coupling 53 adapted to mate with a coupling 54 on meter 13 so that when clutch 47 is engaged, as hereinbefore described, both the meter and the platen are driven.

From the above it may be seen that with only parts described, a very substantial load is placed on clutch 47 when it is engaged. As the several pulleys are rotating at top speed, and thus together with the clutch are abruptly subjected to the full inertia not only of meter 13 but also of the platen and its associated driving mechanism, the meter and the platen, together with its mechanism, would of necessity be rapidly accelerated to top speed, as indicated by the curve 54 (Figure 4). To the end of avoiding this rapid acceleration, and accordingly avoiding such an abrupt imposition of total load on the clutch and driving mechanism, we have provided, as shown in Figure 1, a cam or eccentric 56, the hub 57 of which may be pinned or otherwise fastened to shaft 42. Arranged to ride on the surface of eccentric 56 (see also Figure 3) is a follower or roller 57 rotatably mounted on a stud 58 fixedly projecting from a boss 59 formed between the ends of an arm 60. The upper end of this arm comprises a collar 61 or the like by which the arm is freely mounted on shaft 35 between pulley 34 (Figure 1) and a collar 62. Rotatably mounted on the lower end of arm 60, as by a stud 63, is an idler pulley 64 over which belt 33 is trained. It may now be seen that as eccentric 56 (Figure 3) rotates between the full and broken line positions indicated, arm 60 is rocked back and

forth between its full and broken line positions. As the arm is thus rocked toward its full line position, belt **33** forced from its broken line to its full line position, and accordingly is pulled toward the axis of driving pulley **27**, this radial movement of the belt relative to the pulley being accommodated by the axial movement of pulley side **29** (Figure 1) against the bias of spring **30**. When the cam or eccentric **56** rotates to its broken line position, arm **60**, and accordingly belt **33**, also move to their broken line positions, permitting the spring-biased pulley side to force the belt radially outward of the pulley **29**. Of course, when the belt is in its full line position it is driven at a lesser linear velocity than when it is in its broken line position. It accordingly follows that pulley **34** is driven at a varying angular velocity through a cycle of operation.

In Figure 3 the full line positions of eccentric **56**, arm **60** and belt **33** correspond to the positions of these parts at the beginning of the cycle of operation. In other words, pulley **34**, and accordingly pulleys **38**, **40**, **41**, **46**, and clutch element *47a*, are being driven at a relatively low angular velocity. When clutch **47** is tripped so that gears **48** and **50**, and accordingly shaft **42** and eccentric **56** are rotated, the initial angular velocity of shafts **35** and **42** is relatively low. However, as shaft **42** rotates, so also does eccentric **56**. As the eccentric rotates from its full to its broken line position in Figure 3, belt **33** is permitted to move to the outer portion of pulley **27**, and as it does so, pulley **34** and the various parts driven thereby accelerate generally in the manner indicated by curve **64** (Figure 4). It will be seen that the rate of acceleration is much slower than that indicated by the curve **55**, so that the inertia of the meter and platen is gradually, rather than abruptly overcome, and the clutch and driving mechanism are accordingly not abruptly subjected to the full load of the parts driven thereby. When the mechanism has accelerated to top speed, as indicated by portion S of the curves in Figure 4, the printing operation takes place. Inasmuch as eccentric **56** (Figure 3) effected gradual acceleration of the driving mechanism, so also does it effect gradual deceleration of the mechanism, in accordance with portion *64a* of curve **64** (Figure 4), thus avoiding the otherwise abrupt deceleration indicated by portion *55a* of curve **55**. Thus it may be seen that the decelerating action of eccentric **56**, which is achieved in exactly the same manner as the accelerating action thereof, but in reverse fashion, gradually reduces the momentum of the driven parts, rather than abruptly reducing the momentum thereof, thus decreasing the load on the clutch disengaging mechanism and rendering the operation thereof quieter. It will, of course, be noted that the over-all time for a cycle of operation is not increased by the action of eccentric **56**, and also that the printing operation is effected when the mechanism is operating at top speed. It follows that the envelope or tape is fed through the machine at high linear velocity as not to reduce the capacity of the machine.

As noted hereinbefore, it is usually desirable when the machine is set to print postage on cards or envelopes, to provide an ejecting mechanism to discharge such mail matter subsequent to the printing operation. To this end there is provided an ejecting device, generally indicated at **65**, which may resemble in all important respects the ejecting mechanism described in detail in Patent No. 2,380,331 to Commodore D. Ryan and Edward P. Drake. As described in that patent, mechanism **65** is movable from the solid to the broken line position shown in Figure 1, the solid line position indicating the inoperative position of the ejecting device, the operative position of the device being indicated by broken lines. When the ejecting device is elevated to its operative, i. e. broken line position, it is in proper position to receive cards, envelopes and the like from the printing drum D after the printing operation to eject them from the machine into a suitable hopper or the like (not shown). The ejecting device is driven by a shaft **66**, the right-hand end of which is journaled by a ball and socket bearing **67** mounted in plate **20**. To shaft **66** is secured a friction disc **68** which moves upwardly with the shaft to engage the outer surface of belt **33** (see Figure 2) adjacent idler pulley **70**. In Figure 2, the full line position of friction disc **68** indicates its inoperative position, the operative position of the disc being indicated by the broken line. Accordingly, when in the broken line position, disc **68** is in good frictional engagement with belt **33**, and is accordingly driven thereby, as is also shaft **66**. Operation of the shaft, of course, results in operation of the ejecting device **65**, which accordingly accelerates and decelerates in the same manner as hereinbefore described with respect to the meter, as is desirable. In other words, it is of real advantage that the meter, the platen and the ejector operate at the same rates, in order to handle the mail matter efficiently.

While we have not herein described the mechanism by which gummed tape may be treated, it will suffice to note that such mechanisms are shown and described in detail in the above-identified patents. We will note, however, that such mechanism is operatively associated with ejector **65** in such manner that when the tape mechanism is shifted into operative position, the ejector is shifted into inoperative position, i. e. its full line position shown in Figure 1, as the ejector is unnecessary when the machine is printing on tape.

Accordingly it may be seen that by the above-described mechanisms, the several objects hereinbefore set forth are attained in a thoroughly efficient and practical manner.

As many possible embodiments may be made of the above invention, and as many changes might be made in the embodiment above set forth, it is to be understood that all matter hereinbefore set forth or shown in the accompanying drawing is to be interpreted as illustrative and not in a limiting sense.

We claim:

1. In a mail treating machine having a printing mechanism for printing postage on mail matter, the combination of, a normally stationary drive shaft for driving said printing mechanism, a normally operating motor, driving mechanism including a one revolution clutch operatively connecting said motor and said drive shaft, said driving mechanism being in continuous operation while said motor is running and including a belt and variable radius driving pulley therefor, a normally stationary driven shaft adapted to be actuated when said clutch is engaged means driven by said driven shaft for varying the effective driving radius of said pulley thereby to drive said belt and accordingly said driving mechanism at different velocities, and means responsive to engagement of said clutch for actuating said pulley radius varying means

to vary the rate of operation of said driving mechanism and accordingly said drive shaft.

2. In a mail treating machine having a printing mechanism for printing postage on mail matter, the combination of, a normally stationary drive shaft for driving said printing mechanism, a normally operating motor, driving mechanism including a one revolution clutch operatively connecting said motor and said drive shaft, said driving mechanism being in continuous operation while said motor is running and including a belt and variable radius driving pulley therefor, a normally stationary driven shaft adapted to be actuated when said clutch is engaged means driven by said driven shaft for varying the effective driving radius of said pulley thereby to drive said belt and accordingly said driving mechanism at different velocities, means responsive to engagement of said clutch for actuating said pulley radius varying means to vary the rate of operation of said driving mechanism and accordingly said drive shaft, and an ejecting device connectable with said belt to be driven thereby at rates varying in accordance with the rate variation of said belt as determined by the varying effective driving radius of said pulley.

3. In a mail treating machine having a printing mechanism for printing postage on mail matter, the combination of, a normally stationary drive shaft for driving said printing mechanism, a normally operating motor, driving mechanism including a one revolution clutch operatively connecting said motor and said drive shaft, said driving mechanism being in continuous operation while said motor is running and including a belt and variable radius driving pulley therefor, a normally stationary driven shaft adapted to be actuated when said clutch is engaged means driven by said driven shaft for varying the effective driving radius of said pulley thereby to drive said belt and accordingly said driving mechanism at different velocities, means responsive to engagement of said clutch for actuating said pulley radius varying means to vary the rate of operation of said driving mechanism and accordingly said drive shaft, an ejecting device including a driving disc, and means for engaging said driving disc with said belt thereby to effect operation of said ejecting device at rates varying in accordance with the rate variation of said belt as determined by the varying effective driving radius of said pulley.

4. In a mail treating machine having a printing mechanism for printing postage on mail matter, the combination of, a drive shaft for driving said printing mechanism, a motor which under normal operation of the mail treating machine is operating continuously, a shaft connected to said motor, a tapered driving pulley adapted to drive a V-belt connected to said shaft, one side of said pulley being movable axially of said shaft and spring-biased toward the other side of said pulley, whereby the effective driving radius of the pulley may be varied, driving mechanism including a driven pulley, a V-belt connecting said driving and driven pulleys and accordingly said driving pulley and said driving mechanism, a clutch adapted upon engagement to form a driving connection between said driving mechanism and said printing mechanism drive shaft, an idler pulley in engagement with one run of said belt, movable means mounting said idler pulley for movement relative to said belt, means for moving said movable means to move said idler pulley relative to said belt and accordingly vary the length of the loop of the belt about said driving and driven pulleys and thereby to effect relative movement between the sides of the driving pulley to vary the effective driving radius thereof, whereby the velocity of said belt and accordingly that of the driving mechanism is varied, and means responsive to engagment of said clutch for operating said last-mentioned means.

5. In a mail treating machine having a printing mechanism for printing postage on mail matter, the combination of, a drive shaft for driving said printing mechanism, a motor which under normal operation of the mail treating machine is operating continuously, a shaft connected to said motor, a tapered driving pulley adapted to drive a V-belt connected to said shaft, one side of said pulley being movable axially of said shaft and spring-biased toward the other side of said pulley, whereby the effective driving radius of the pulley may be varied, driving mechanism including a driven pulley, a V-belt connecting said driving and driven pulleys and accordingly said driving pulley and said driving mechanism, a clutch adapted upon engagement to form a driving connection between said driving mechanism and said printing mechanism drive shaft, an idler pulley in engagement with one run of said belt, movable means mounting said idler pulley for movement relative to said belt, means for moving said movable means to move said idler pulley relative to said belt and accordingly vary the length of the loop of the belt about said driving and driven pulleys and thereby to effect relative movement between the sides of the driving pulley to vary the effective driving radius thereof, whereby the velocity of said belt and accordingly that of the driving mechanism is varied, means responsive to engagement of said clutch for operating said last-mentioned means, an ejecting device including a friction driving disc therefor, and means for engaging said driving disc with said belt to effect operation of said ejecting means at the same rate as said belt.

ROBERT A. DOHL.
EDWARD G. ZIEGELHOEFER.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
939,427	Main	Nov. 9, 1909
2,141,119	Wheeler, Jr. et al.	Dec. 20, 1938
2,199,012	Skelly	Apr. 30, 1940
2,215,831	Heyer	Sept. 24, 1940