

Sept. 16, 1947.

C. E. COX

2,427,387

MOTOR DRIVEN PUNCH

Filed Oct. 12, 1945

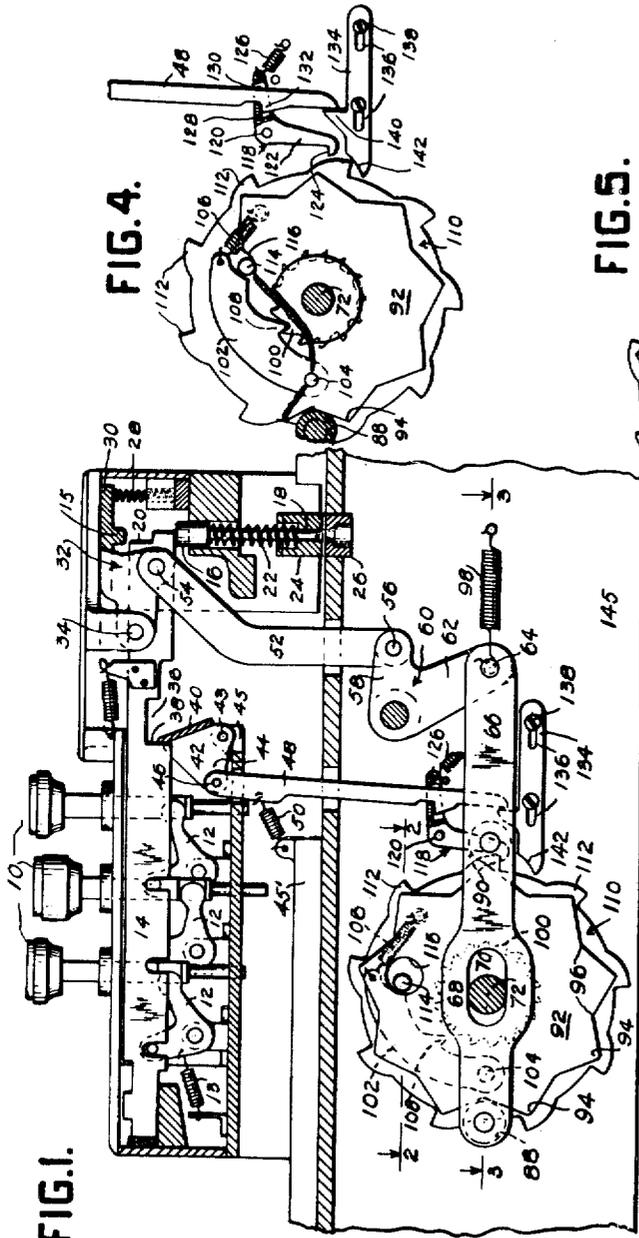


FIG. 1.

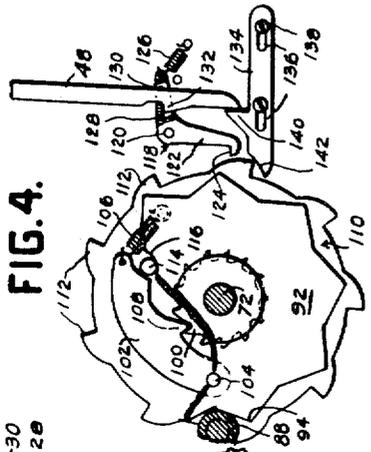


FIG. 4.

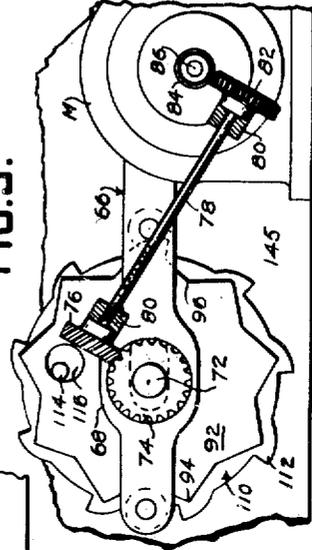


FIG. 5.

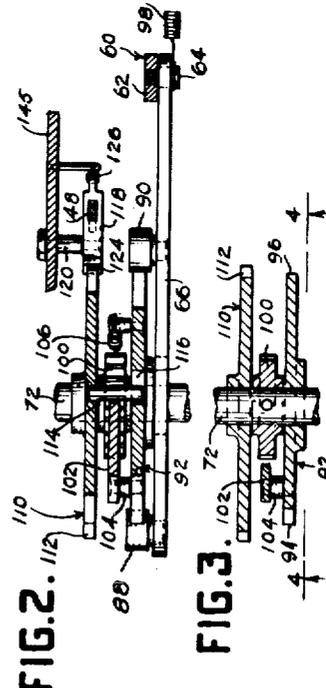


FIG. 2.

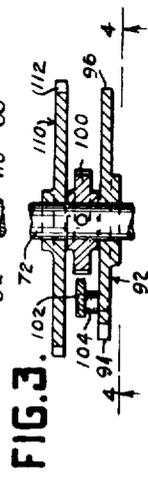


FIG. 3.

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2,427,387

MOTOR-DRIVEN PUNCH

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Application October 12, 1945, Serial No. 621,940

8 Claims. (Cl. 164—112)

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The present invention relates to card perforating or punching apparatus designed for use in connection with the perforated card tabulating art. In this art, data is applied to the record cards in code by perforating the card in certain predetermined positions. The perforations in the card are adapted to be sensed by tabulating machines, after which the data may then be printed and accumulated in a manner well known in the art.

In the U. S. patent to Fred L. Lee and Burdette H. Phillips, No. 1,772,186, dated August 5, 1930, for a "Duplicating punching device," a perforating machine is disclosed wherein the operator depresses the keys for selecting a particular punch for operation, and in so doing at the same time closes an electric circuit through an electromagnet. By virtue of energization of the magnet, the selected punch is thereby operated to perforate the card.

According to the present invention, an electric motor is provided which is maintained in constant rotation while the punching apparatus is being used. This motor serves to maintain an actuating shaft in constant rotation and, by means of the shaft and certain actuating instrumentalities associated therewith, a selected punch is quickly actuated upon depression of a corresponding punch-selecting key. After depression of the key and actuation of the punch, the parts are immediately returned to normal position in readiness for the next key depression. In addition to the above, a non-repeat feature is incorporated in the actuating mechanism whereby the depression of a single key will cause single actuation of its corresponding punch and whereby prolonged depression of the key will in no manner alter the operation of the mechanism so that a single punching operation will result.

The present invention is designed to overcome many of the limitations that are attendant upon the use of electrically operated key punch machines of this type. One of these limitations resides in the undue amount of noise associated with the movement of the magnet armature and linkage mechanism connecting the latter to the hammer plate, as well as the noise emitted by depression and release of the hammer plate itself. According to the present invention, this limitation has, in a large measure, been remedied by the provision of a cam and clutch mechanism including a cam drive element which operates upon the linkage system positively in both directions in such a manner that the hammer plate or punch operating ball, as it is sometimes

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termed, is momentarily lowered and subsequently elevated again by a positive drive through the linkage system, thus eliminating the conventional snap-back action formerly resorted to and consequently eliminating considerable noise. In addition to this, since the use of electromagnets is dispensed with altogether, the usual noise associated with these magnets is, of course, eliminated without sacrificing fast action of the punches.

Another feature that has been borne in mind in the production and development of the present invention is interchangeability of parts with the standard parts of machines of the type shown and described in the above mentioned patent to Lee et al. By the provision of the present invention, punching apparatus has been devised in which considerably greater power is available for forcing the punches through the card so that it is possible, if desired, to perforate several cards at once.

The provision of an apparatus of the character briefly outlined above being the principal object of the invention, another object thereof is to provide a machine which may be operated with greater speed than has heretofore been possible.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

Fig. 1 is a side elevational view, partly in section, of a preferred embodiment of the invention.

Fig. 2 is a sectional view taken substantially along the line 2—2 of Fig. 1.

Fig. 3 is a sectional view taken substantially along the line 3—3 of Fig. 1.

Fig. 4 is a fragmentary view taken substantially along the line 4—4 of Fig. 3 showing the position of the parts at the instant when the selected key punch is depressed.

Fig. 5 is a fragmentary, detail, sectional view showing the driving mechanism for the punching instrumentalities.

In all of the above described views like characters of reference are employed to designate like parts throughout.

Referring now to the drawings in detail and in particular to Fig. 1, upon depression of any one of a set of punch selecting keys 10, a corresponding bell crank lever 12 is rocked against the action of a spring 13 and a corresponding interposer 14 is advanced so that the upper edge there-

of lies underneath a transverse member or depresser 15. An individual interposer 14 is provided for each selecting key 10 and each of the interposers overlies the head 16 of a corresponding punch 18, the upper edge of each interposer being cut away as at 20 so that when the interposer is in its normal retracted position a downward movement of the depresser 15 will not actuate the interposer. When, however, any one of the interposers is advanced to its effective operative position, a downward movement of the depresser 15 will depress the effectively positioned interposer and, as a consequence, the corresponding punch 18 will be moved downwardly against the action of its spring 22 to punch or perforate a card or several thicknesses of cards lying between a guide member 24 and a die member 26. Normally, the depresser 15 is held in raised position by means of a spring 28 interposed between a fixed part of the frame and a lug 30 projecting from the hammer plate 32, the latter being pivoted as at 34 and of which the depresser 15 constitutes a part. Each of the interposers 14 is formed with a notch 36 on its underneath side to provide a shoulder 38 designed for engagement with the movable cross bar 40 of a bail 42 pivoted at 43 on a fixed part of the frame 45 of the machine. The bail 42 is provided with a rearwardly extending arm 44 which pivotally carries as at 46 a depending rod 48, the nature and function of which will be subsequently described. The rod 48 is normally urged in a counter-clockwise direction, i. e., to the left, as viewed in Fig. 1, by means of a spring 50 attached to a fixed part of the frame 45'. Upon advance movement of any one of the interposers 14, the bail 42 will be swung about its pivotal axis 43 in a clockwise direction, as viewed in Fig. 1, and the rod 48 will be lifted to perform certain functions in connection with the hammer plate drive assembly, the nature of which will now be fully set forth.

Reciprocation of the hammer plate 32 to actuate the punches 8 is effected through a linkage system including a bent link 52, the upper end of which is pivoted as at 54 to an outer portion of the hammer plate and the lower end of which is pivoted as at 56 to one arm 58 of a bell crank lever 60. The other arm 62 of the bell crank lever 60 is pivoted at its lower end as at 64 to one end of a reciprocable driving arm 66.

Still referring to Fig. 1 and in addition to Figs. 2 and 4, the driving arm 66 is provided with an enlarged medial region 68 which is slotted as at 70. An actuating shaft 72, suitably journaled in the frame 145, passes through the slot 70 formed in the arm 66 and serves in the manner of a guide pin for controlling the path of movement of the reciprocable arm. The shaft 72 is adapted to be continuously rotated at a constant rate of speed, and toward this end, as may be seen in Fig. 5, it carries a gear 74 at one end thereof which meshes with a spiral gear 76 mounted on a shaft 78 rotatably supported in bearings 80 secured to the outer framework. The shaft 78 also carries a worm wheel 82 which meshes with a worm gear 84 disposed on the motor shaft 86 of a constant speed electric motor M suitably mounted in the framework.

The reciprocable driving arm 66 has mounted thereon a pair of spaced cam rollers 88 and 90, the former being mounted adjacent one end of the arm and the latter being mounted medially thereof. A cam 92 in the form of a star wheel is loosely disposed upon the shaft 72 (see Figs. 1, 2 and 3) and operates at predetermined se-

lected times between the two cam rollers 88 and 90 and serves to cause reciprocation of the driving arm 66. The cam or star wheel 92 is provided with an odd number of cam points 94 or projections thereon which, for convenience in the present instance, are nine in number. Such an arrangement of cam points results in the provision of a high cam dwell at certain points on the periphery of the wheel and in the provision of low dwell points 96 at points diametrically opposed to the high dwell points 94. The linear distance between the two cam rollers 88 and 90 is substantially equal to the linear distance existing between a point 96 of low dwell and a point 94 of high dwell. Since the cam or star wheel 92 is uniform in its design around the periphery thereof, it will be seen that upon rotation of the former the driving arm 66 will be positively moved to the left each time a high dwell point 94 passes the roller 88 and it will also positively be moved to the right each time such a high dwell point passes the cam roller 90. In this manner, positive driving of the arm 66 in opposite directions will occur. The cam or star wheel 92 is adapted to be clutched in and out of engagement with the constantly rotating shaft 72 in a manner that will subsequently be described and, in order that the driving arm 66 shall normally be maintained in its right-hand position, as viewed in Fig. 1, with the roller 88 resting in a low dwell region of the star wheel when the clutching arrangement is inoperative, a coil spring 98 having one end thereof attached to an end of the arm and the other end thereof attached to a fixed point on the framework 145 serves to normally draw the arm 66 to its right-hand position of rest.

Referring now to Figs. 1, 2, 3 and 4, the constantly rotating shaft 72 has mounted thereon and pinned thereto a ratchet wheel 100 forming one element of a ratchet and pawl clutch device. By virtue of the peculiar mode of operation of this ratchet and pawl clutch device, and as will become apparent presently, it is deemed appropriate to term the same a fractional revolution clutch, inasmuch as engagement and disengagement thereof takes place during a fractional portion of one revolution of the input clutching element. The other element of the fractional revolution clutch device is in the form of a pawl 102 which is pivoted at one end thereof as at 104 to an eccentric point on the inner side of the cam or star wheel 92. The pawl 102 is spring-pressed as at 106 and is provided with a tooth or shoulder 108 which, by virtue of the spring 106, is normally urged into engagement with the teeth on the ratchet wheel 100.

From the above description of parts it will be seen that inasmuch as the pawl 102 is carried by and movable with the cam or star wheel 92, it will, at such times as when it is in engagement with the teeth on the ratchet wheel 100, serve to drive the cam or star wheel 92 in the same direction as the direction of rotation of the shaft 72.

Referring now to Figs. 1, 3 and 4, a second and relatively larger ratchet or latch wheel 110 is loosely disposed upon the shaft 72 and is provided with a series of relatively widely spaced teeth or protuberances 112 on the periphery thereof, which teeth correspond in number to the number of high dwell or projection points 94 on the cam or star wheel 92. A pin or finger 114 projects outwardly from a point adjacent the free periphery of the wheel 110 and underlies the free

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end of the pawl 102. The pin or finger 114 also extends into an aperture or opening 116 formed in the cam or star wheel 92 in the peripheral regions thereof.

The function of the latch wheel 110 is to selectively permit engagement of the ratchet wheel 100 by the pawl 102 and accordingly a latch member 118 in the form of an angle piece is pivoted as at 120 to a stationary part of the framework 145. The member 118 is provided with a vertically disposed arm 122 and carries a latch shoulder 124 near the bottom thereof designed for successive engagement with the teeth 112 formed on the latch wheel 110. The latch member 118 is spring-pressed as at 126 in such a manner that the shoulder 124 is normally urged into a position wherein it is disposed directly in the path of movement of the successively oncoming teeth 112 formed on the latch wheel 110.

From the above description, it will be seen that when the latch wheel 110 is restrained in its rotational movement about the axis of the shaft 72, by virtue of engagement between the shoulder 124 and one of the teeth 112 on the latch wheel, rotation of the star wheel 92 is rendered impossible by virtue of the fact that the pin or finger 114 mounted on the latch wheel 110 will engage the inner edge of the aperture 116. The point of pivotal connection between the pawl 102 and inner side of the star wheel 92, the length of the pawl, and the extent of its curvature is such that when the star wheel 92 and latch wheel 110 occupy the specific relationship with respect to each other, shown in Fig. 1, the pin or finger 114 will underlie the pawl 102 in such a manner as to hold this pawl in a position of disengagement from the ratchet wheel 100. With the parts thus disengaged, the shaft 72 may continue to rotate while the star wheel 92, pawl 102 and latch wheel 110 will be held stationary under the restraining influence of the shoulder 124. When these various parts are thus held stationary, the driving arm 66 will occupy its extreme right-hand position under the influence of the spring 98 with one roller 88 occupying a position of low dwell on the star wheel 92 and the other roller 90 occupying a position of high dwell thereon. When the driving arm 66 is in this righthand position, as viewed in Fig. 1, the linkage system, including the bell crank lever 60 and bent link 52, will be such that the hammer plate 32 is maintained elevated.

The latch member 118 is provided with a horizontal arm 128 (Fig. 4) which is slotted as at 130 for reception therethrough of the depending rod 48. The lower end of the depending rod 48 is formed with a shoulder 132 thereon which cooperates with the underneath side of the arm 128 for lifting purposes in order that the latch member 118 may be moved in a counterclockwise direction when the bail 42 is actuated to cause the shoulder 124 to be withdrawn from the path of movement of the teeth 112 on the latch wheel 110. When this occurs, the various parts are permitted to assume the positions shown in Fig. 4, the resulting action being substantially as follows.

Upon tilting movement of the bail 42 in the usual manner, as occasioned by depression of one of the character keys 10, the depending rod 48 will be elevated slightly and the shoulder 132 formed on the latter will cause rocking movement of the angular latch member 118 in a counter-clockwise direction, as viewed in Fig. 4, whereupon the shoulder 124 will be withdrawn from its latching engagement with one of the teeth 112 on the latch

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wheel 110. The latch wheel 110 will then be free to turn in a clockwise direction and an initial limited amount of turning movement thereof will result, by virtue of the fact that the star wheel is held in position by the rollers 88 and 90 and the pawl 102 bears against the pin or finger 114 under the influence of the spring 106. Such initial turning movement of the latch wheel 110 will be expended at such time as the tooth 108 on the pawl 102 falls into mesh with the teeth on the ratchet wheel 100. Thereafter, movement of the shaft 72 is picked up by the pawl 102 and star wheel 92 which, under the driving influence of the pawl, rotates the star wheel and latch wheel through a limited degree of turning movement until such time as the next adjacent tooth 112 on the latter engages the shoulder 124 which, by this time, in the normal course of events, has been restored to its advanced latching position. As soon as the latch wheel 110 is again latched, as just described, the pawl 102 will ride outwardly on the pin or finger 114 and the tooth 108 thereof will become disengaged from the teeth of the constantly rotating ratchet wheel 100. This operation will serve to disengage the shaft 72 from its clutching engagement with the star wheel 92.

Non-repetitive punching is made possible by virtue of the provision of a laterally reciprocable slide member 134. The member 134 is in the form of an elongated bar having formed therein a pair of spaced slots 136 through which stationary guide pins 138 carried by the framework 145 extend. The slide member 134 is provided with a shoulder or abutment 140 designed for engagement with the lower regions of the depending rod 48. The forward or left-hand end of the slide member 134, as viewed in Figs. 1 and 4, is provided with an inclined cam portion 142 adapted to be projected into the path of movement of successive teeth 112 formed on the latch wheel 110. Normally, when the driving arm 66 is in its right-hand position, as viewed in Figs. 1 and 2, the member 134 is urged toward the left under the influence of the spring 50 which biases the depending rod 48 in a counter-clockwise direction. If, during operation of the apparatus, an operator inadvertently maintains one of the actuating keys 10 depressed for a prolonged period of time, one of the teeth 112 which is released by the shoulder 132 on the latch member 118 will engage the inclined cam portion 142 formed on the slide member 134 in passing and thus force the slide member to its right-hand position, whereupon the shoulder 140, by virtue of its engagement with the depending rod 48, will swing the latter toward the right. Such swinging movement of the rod 48 will cause the shoulder 132 thereon to be shifted out of the path of movement of the edge of the slot 130 to allow the spring 126 to become effective and cause the shoulder 124 on the latch member 118 to be projected into the path of movement of an oncoming protuberance 112 on the latch wheel 110. Thus it will be seen that whether the operating keys 10 be momentarily depressed or depressed for a prolonged period of time, a single shifting cycle of the operating arm 66 and a consequent single depression of the hammer plate 32 will result.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a preferred embodiment, it will be understood that various omissions and substitutions and changes in the form and details of the apparatus illustrated and in its

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operation may be made by those skilled in the art, without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. In a record perforating machine having a depressable punch-operating hammer plate operable upon depression thereof to effect punching operations, and a depressable ball operable upon depression thereof to initiate such punching operations, non-repetitive actuating mechanism for said plate comprising a reciprocable driving arm operatively connected to said hammer plate and movable from one extreme position wherein said motor plate is elevated to another extreme position wherein the plate is depressed, a cam operable upon rotation thereof to reciprocate said arm, a rotatable driving shaft, means for continuously rotating said shaft, a fractional revolution clutch for operatively connecting said shaft and cam, said clutch normally remaining inoperative and being operative upon an initial actuation thereof to initiate a predetermined fraction of a revolution of said cam under the influence of said shaft, means operable upon an initial depression of said ball for rendering said clutch operative, and means likewise operable upon prolonged depression of said ball for preventing initiation of an additional fractional revolution of said cam.

2. In a record perforating machine having a depressable punch-operating hammer plate operable upon depression thereof to effect punching operations, and a depressible bail operable upon depression thereof to initiate such punching operations, actuating mechanism for said plate comprising a reciprocable driving arm operatively connected to said hammer plate and movable from one extreme position wherein said hammer plate is elevated to another extreme position wherein the plate is depressed, a rotatable driving shaft, means for continuously rotating said shaft, a cam loosely disposed upon said shaft, clutch means operable when engaged to connect said cam and shaft in driving relationship, a pair of cam rollers carried by said driving arm and straddling said cam, said cam being operable upon rotation thereof to engage said rollers and reciprocate the arm, and means operable upon depression of said bail for engaging said clutch means.

3. In a record perforating machine having a depressable punch-operating hammer plate operable upon depression thereof to effect punching operations, and a depressable bail operable upon depression thereof to initiate such punching operations, actuating mechanism for said plate comprising a reciprocable driving arm operatively connected to said hammer plate and movable from one extreme position wherein said hammer plate is elevated to another extreme position wherein the plate is depressed, a rotatable driving shaft, means for continuously rotating said shaft, a cam loosely disposed on said shaft, a fractional revolution clutch operable when engaged to connect said cam and shaft in driving relationship, a pair of cam rollers carried by said driving arm and straddling said cam, said cam being operable upon rotation thereof to engage said rollers and reciprocate the arm, and means operable upon depression of said bail for actuating said clutch means.

4. In a record perforating machine having a depressable punch operating hammer plate op-

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erale upon depression thereof to effect punching operations, and a depressable ball operable upon depression thereof to initiate such punching operations, actuating mechanism for said plate comprising a reciprocable driving arm operatively connected to said hammer plate and movable from one extreme position wherein said hammer plate is elevated to another extreme position wherein the plate is depressed, a rotatable driving shaft, means for continuously rotating said shaft, a cam loosely disposed upon said shaft, a pair of cam rollers carried by said driving arm and straddling said cam, said cam being operable upon rotation thereof to engage said rollers and reciprocate the arm positively in opposite directions, a toothed latch wheel loosely disposed upon said shaft, a toothed ratchet wheel mounted on and rotatable with the shaft, a pawl pivotally mounted on said cam and movable bodily therewith, means normally urging said pawl into engagement with said ratchet wheel, there being a lost motion driving connection between said cam and latch wheel, a restraining latch normally engaging said latch wheel, means operable upon depression of said bail for disengaging said restraining latch, a pin carried by said latch wheel, and a cam surface formed on said pawl and designed for engagement with said pin when the latch wheel is restrained to cause the pawl to become disengaged from said ratchet wheel.

5. In a record perforating machine having a depressable punch operating hammer plate operable upon depression thereof to effect punching operations, and a depressable bail operable upon depression thereof to initiate such punching operations, actuating mechanism for said plate comprising a reciprocable driving arm operatively connected to said hammer plate and movable from one extreme position wherein said hammer plate is elevated to another extreme position wherein the plate is depressed, a rotatable driving shaft, means for continuously rotating said shaft, a cam loosely disposed upon said shaft, a pair of cam rollers carried by said driving arm and straddling said cam, said cam being operable upon rotation thereof to engage said rollers and reciprocate the arm positively in opposite directions, a toothed latch wheel loosely disposed upon said shaft, a toothed ratchet wheel mounted on and rotatable with the shaft, a pawl pivotally mounted on said cam and movable bodily therewith, means normally urging said pawl into engagement with said ratchet wheel, there being a lost motion driving connection between said cam and latch wheel, a restraining latch normally engaging said latch wheel, means operable upon depression of said bail for disengaging said restraining latch, a pin carried by said latch wheel, and a cam surface formed on said pawl and designed for engagement with said pin when the latch wheel is restrained to cause the pawl to become disengaged from said ratchet wheel, said pin constituting a part of said lost motion connection.

6. In a record perforating machine having a depressable punch operating hammer plate operable upon depression thereof to effect punching operations, and a depressable bail operable upon depression thereof to initiate such punching operations, actuating mechanism for said plate comprising a reciprocable driving arm operatively connected to said hammer plate and movable from one extreme position wherein said hammer plate is elevated to another extreme

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position wherein the plate is depressed, a rotatable driving shaft, means for continuously rotating said shaft, a cam loosely disposed upon said shaft, a pair of cam rollers carried by said driving arm and straddling said cam, said cam being operable upon rotation thereof to engage said rollers and reciprocate the arm positively in opposite directions, a toothed latch wheel loosely disposed upon said shaft, a toothed ratchet wheel mounted on and rotatable with the shaft, a pawl pivotally mounted on said cam and movable bodily therewith, means normally urging said pawl into engagement with said ratchet wheel, there being a lost motion driving connection between said cam and latch wheel, a restraining latch normally engaging said latch wheel, means operable upon depression of said bail for disengaging said restraining latch, a pin carried by said latch wheel, a cam surface formed on said pawl and designed for engagement with said pin when the latch wheel is restrained to cause the pawl to become disengaged from said ratchet wheel, and means operable immediately after initial depression of said bail to restore said restraining latch to its normal position.

7. In a record perforating machine having a depressible punch operating hammer plate operable upon depression thereof to effect punching operations, and a depressible bail operable upon depression thereof to initiate such punching operations, actuating mechanism for said plate comprising a reciprocable driving arm operatively connected to said hammer plate and movable from one extreme position wherein said hammer plate is elevated to another extreme position wherein the plate is depressed, a rotatable driving shaft, means for continuously rotating said shaft, a cam loosely disposed upon said shaft, and operable upon rotation thereof to reciprocate said arm, a toothed latch wheel loosely disposed upon said shaft, a toothed ratchet wheel mounted on and rotatable with the shaft, a pawl pivotally mounted on said cam and movable bodily therewith, means normally urging said pawl into engagement with said ratchet wheel, there being a lost motion driving connection between said cam and latch wheel, a restraining latch normally engaging said latch wheel, means operable upon depression of said bail for disengag-

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ing said restraining latch, a pin carried by said latch wheel, and a cam surface formed on said pawl and designed for engagement with said pin when the latch wheel is restrained to cause the pawl to become disengaged from said ratchet wheel.

8. In a record perforating machine having a depressible punch operating hammer plate operable on depression thereof to effect punching operations and a depressible bail operable upon depression thereof to initiate said punching operations, actuating mechanism for said hammer plate comprising a reciprocating driving arm operatively connected to said hammer plate and movable from an extreme position wherein the hammer plate is elevated to an extreme position wherein said plate is depressed, a rotatable driving shaft, means for continuously rotating said shaft, a cam loosely disposed on said shaft, means operable upon rotation of said cam for reciprocating said driving arm, a fractional revolution clutch for operatively connecting said shaft and arm, said clutch being operable upon an initial actuation thereof to initiate a predetermined fractional revolution of said cam sufficient to cause said driving arm to be moved from one extreme position thereof to the other, said clutch including a latch wheel having latch protuberances thereon, a latch member normally positioned in the path of said protuberances, means operable upon depression of said bail for withdrawing said latch from the path of said protuberances, and means operable upon continued rotation of said latch wheel for restoring said latch to its normal position in the path of said protuberances.

CHARLES E. COX.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,804,994	Lasker	May 12, 1931
1,882,859	Mills	Oct. 18, 1932
2,030,405	Schaaff	Feb. 11, 1936
2,397,112	Hueber	Mar. 26, 1946

Certificate of Correction

Patent No. 2,427,387.

September 16, 1947.

CHARLES E. COX

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Column 7, line 16, strike out "motor" and insert instead *hammer*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 2d day of December, A. D. 1947.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.

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position wherein the plate is depressed, a rotatable driving shaft, means for continuously rotating said shaft, a cam loosely disposed upon said shaft, a pair of cam rollers carried by said driving arm and straddling said cam, said cam being operable upon rotation thereof to engage said rollers and reciprocate the arm positively in opposite directions, a toothed latch wheel loosely disposed upon said shaft, a toothed ratchet wheel mounted on and rotatable with the shaft, a pawl pivotally mounted on said cam and movable bodily therewith, means normally urging said pawl into engagement with said ratchet wheel, there being a lost motion driving connection between said cam and latch wheel, a restraining latch normally engaging said latch wheel, means operable upon depression of said bail for disengaging said restraining latch, a pin carried by said latch wheel, a cam surface formed on said pawl and designed for engagement with said pin when the latch wheel is restrained to cause the pawl to become disengaged from said ratchet wheel, and means operable immediately after initial depression of said bail to restore said restraining latch to its normal position.

7. In a record perforating machine having a depressible punch operating hammer plate operable upon depression thereof to effect punching operations, and a depressible bail operable upon depression thereof to initiate such punching operations, actuating mechanism for said plate comprising a reciprocable driving arm operatively connected to said hammer plate and movable from one extreme position wherein said hammer plate is elevated to another extreme position wherein the plate is depressed, a rotatable driving shaft, means for continuously rotating said shaft, a cam loosely disposed upon said shaft, and operable upon rotation thereof to reciprocate said arm, a toothed latch wheel loosely disposed upon said shaft, a toothed ratchet wheel mounted on and rotatable with the shaft, a pawl pivotally mounted on said cam and movable bodily therewith, means normally urging said pawl into engagement with said ratchet wheel, there being a lost motion driving connection between said cam and latch wheel, a restraining latch normally engaging said latch wheel, means operable upon depression of said bail for disengag-

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8. In a record perforating machine having a depressible punch operating hammer plate operable on depression thereof to effect punching operations and a depressible bail operable upon depression thereof to initiate said punching operations, actuating mechanism for said hammer plate comprising a reciprocating driving arm operatively connected to said hammer plate and movable from an extreme position wherein the hammer plate is elevated to an extreme position wherein said plate is depressed, a rotatable driving shaft, means for continuously rotating said shaft, a cam loosely disposed on said shaft, means operable upon rotation of said cam for reciprocating said driving arm, a fractional revolution clutch for operatively connecting said shaft and arm, said clutch being operable upon an initial actuation thereof to initiate a predetermined fractional revolution of said cam sufficient to cause said driving arm to be moved from one extreme position thereof to the other, said clutch including a latch wheel having latch protuberances thereon, a latch member normally positioned in the path of said protuberances, means operable upon depression of said bail for withdrawing said latch from the path of said protuberances, and means operable upon continued rotation of said latch wheel for restoring said latch to its normal position in the path of said protuberances.

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[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.