A. T. BROWN.

RECORDING MACHINE.

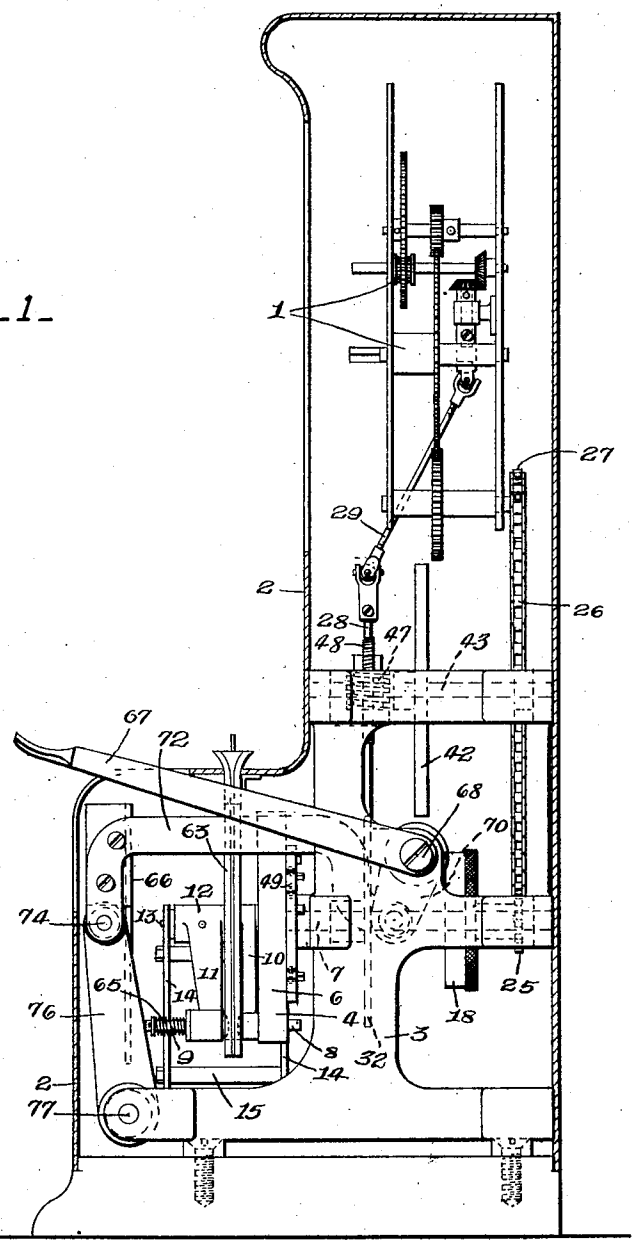
APPLICATION FILED JUNE 5, 1915.

1,325,138.

Patented Dec. 16, 1919.

5 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

C. H. Young.

Inventor

Alexander T. Brown

By Attorney

Parsons & Bodell.

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5 SHEETS—SHEET 2.

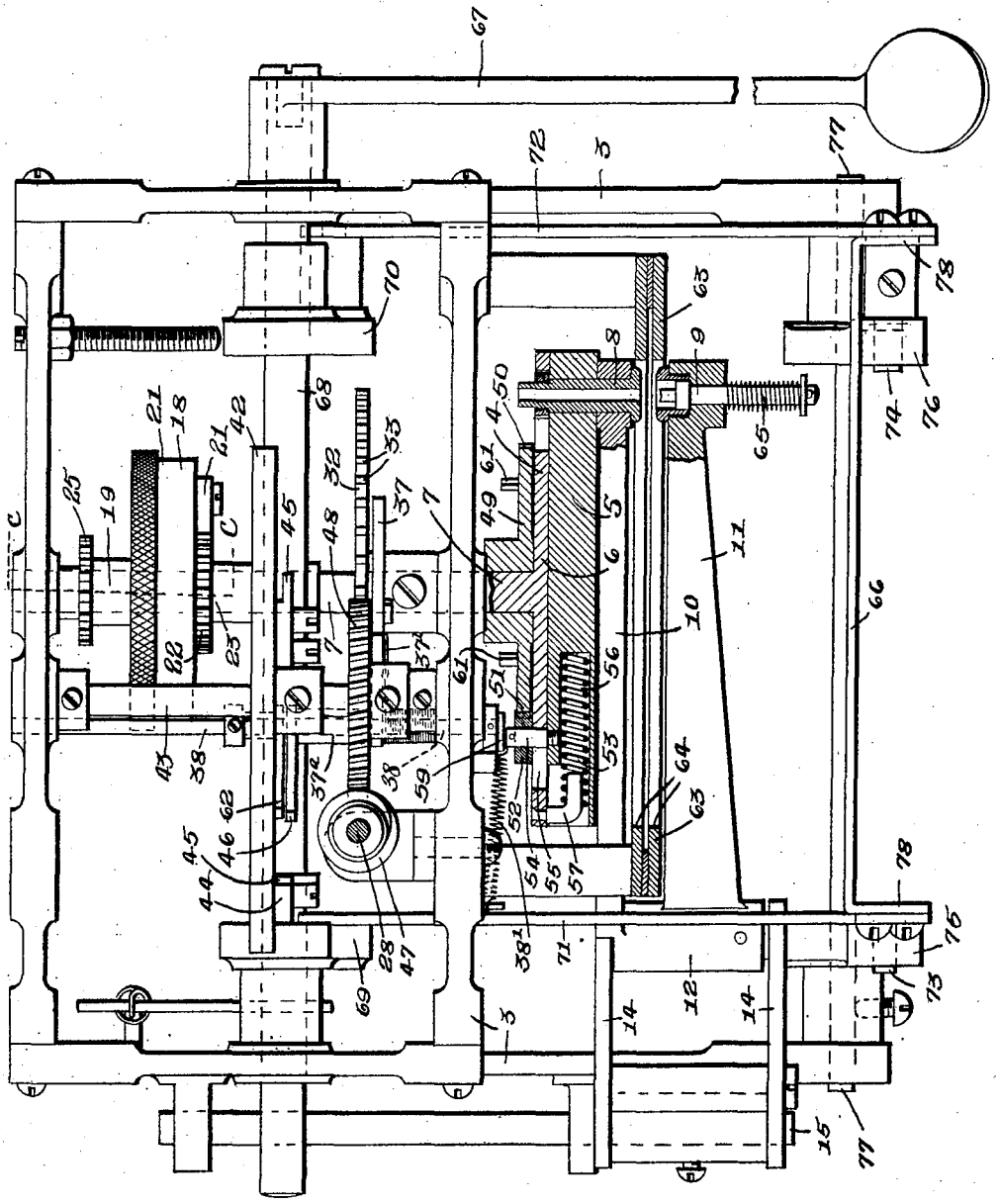

Fig. 2.

Witnesses:

C. H. Young.

Inventor

Alexander T. Brown.

By Attorneys.

Parsons & Bodell

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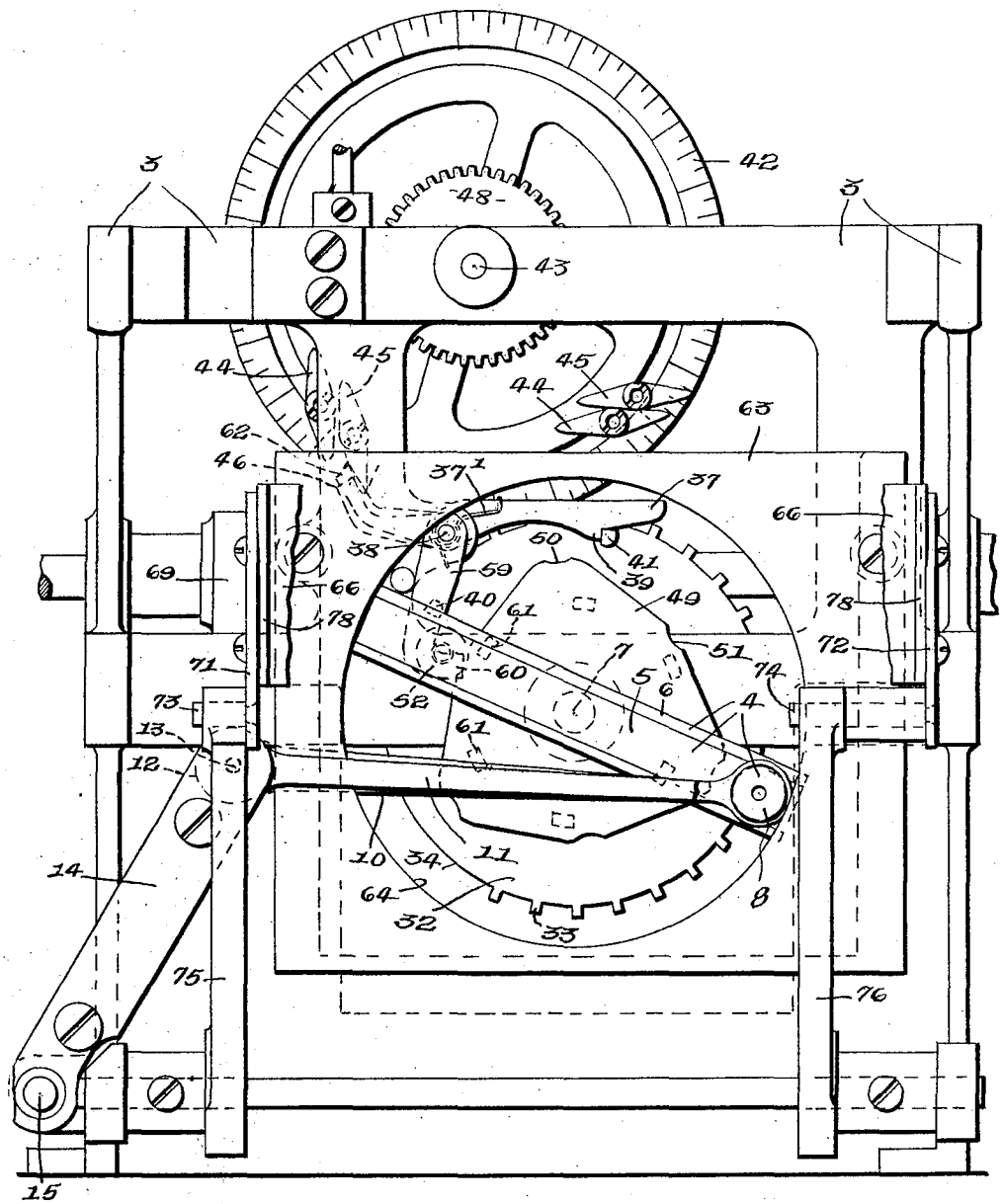
5 SHEETS—SHEET 3.

Fig. 3.



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5 SHEETS—SHEET 4.

Fig. 4.

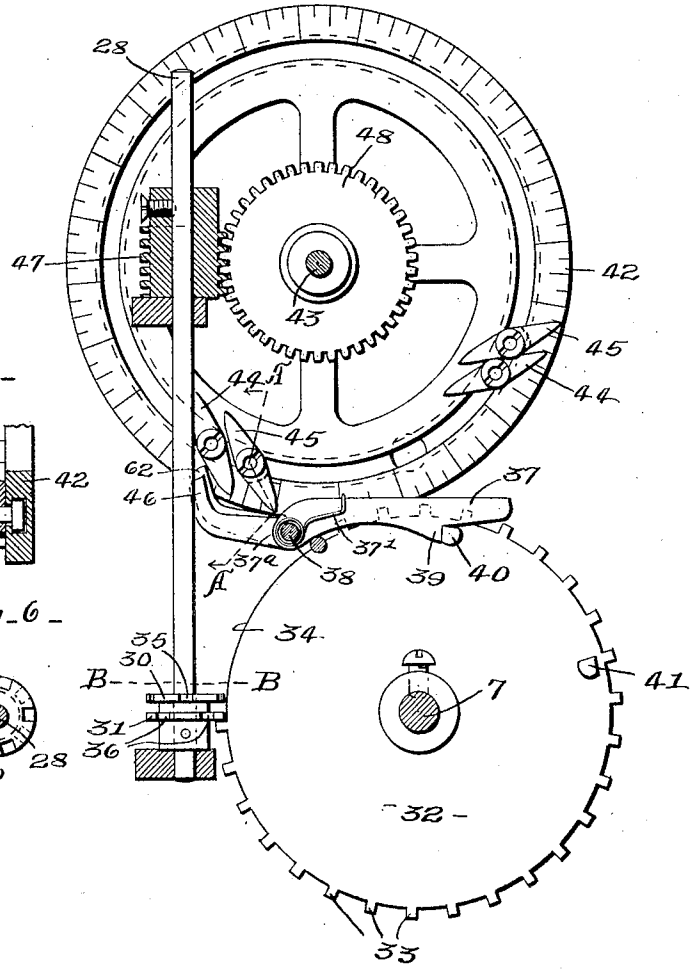


Fig. 5.

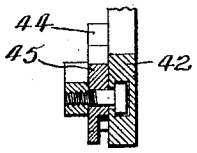
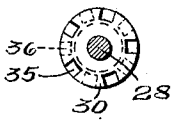


Fig. 6.



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By Attorney

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5 SHEETS—SHEET 5.

Fig. 8.

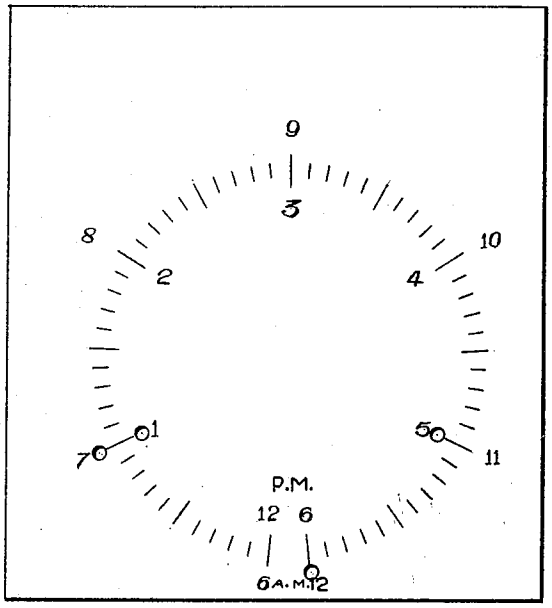
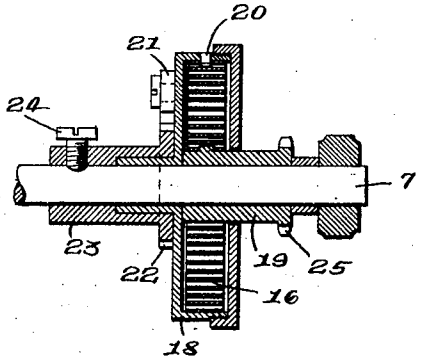


Fig. 7.



Witnesses:

C. H. Young.

Inventor

Alexander J. Brown.

By Attorneys,

Parsons & Bartell.

UNITED STATES PATENT OFFICE.

ALEXANDER T. BROWN, OF SYRACUSE, NEW YORK.

RECORDING-MACHINE.

1,325,138. Specification of Letters Patent. Patented Dec. 16, 1919.

Application filed June 5, 1915. Serial No. 32,321.

To all whom it may concern:

Be it known that I, ALEXANDER T. BROWN, a citizen of the United States, and a resident of Syracuse, in the county of Onondaga and State of New York, have invented a certain new and useful Recording-Machine, of which the following is a specification.

This invention relates to recording machines, and particularly time recorders in which the records are made upon cards, and it has for its object a particularly simple and efficient means by which the perfect records of the different workmen are all made at the regular entering and regular leaving times irrespective of whether the workman enters several minutes early or leaves several minutes late.

The invention further has for its object simple and efficient means for controlling the movement of the recorder or marker. Other objects will appear throughout the specification.

The invention consists in the combinations and constructions hereinafter set forth and claimed.

In describing this invention, reference is had to the accompanying drawings, in which like characters designate corresponding parts in all the views.

Figure 1 is a vertical sectional view, partly in elevation, of a time recorder embodying my invention.

Fig. 2 is a plan of the recording mechanism, partly in section.

Fig. 3 is an enlarged front elevation looking upwardly in Fig. 2, parts being broken away.

Fig. 4 is a detail view of the mechanism for controlling the advance of the recorder.

Figs. 5 and 6 are sectional views taken respectively on lines A—A and B—B, Fig. 4.

Fig. 7 is a sectional view taken on the plane of line C—C, Fig. 2.

Fig. 8 is a plan view of the card used in connection with my recording machine.

This recording machine comprises, generally, a recorder or marker, a driving mechanism having a uniformly actuated driving element connected to the recorder, means for setting the recorder ahead of the driving element, means for holding the recorder in its advanced position until the driving element has caught up with the recorder and the synchronism of the driving element and the recorder is restored, and means actuated by the driving means for controlling the advance of the recorder and the operation of the holding means.

The machine further comprises a recorder including a shiftable member and means for shifting said member relatively to its feeding movement at the time the recorder is being advanced relatively to the uniformly actuated driving element.

This invention is here shown as embodied in a time recording machine and the time movement is the driving mechanism or prime mover and controls the various operations of the mechanisms to be described.

1 designates the time movement which is located in the upper portion of the inclosing case 2 of the machine. 3 is a frame located in the lower portion of the case 2 and supporting the mechanism constituting the invention.

4, Figs. 2 and 3, is the recorder mechanism as a whole which is here shown as rotatable about an axis and as including an impression making member or members shiftable radially relatively to said axis at predetermined periods. As here shown, the recorder is a punch including two members or sections, one of which is mounted on a slide 5 movable radially in the front of a body 6 mounted upon a shaft 7 suitably journaled in the frame 3, and the other of which is a plunger opposed to the former member and normally spaced apart therefrom. During one working period, as in the morning, the recorder members are held in their outer position relatively to the axis of the shaft 7, whereas, in another period, as the afternoon, they are held in their inner position relatively to said shaft.

The slide 5 moves in a channel in the body 6 and is held therein at one end by the arm 10 to be described and at the other end by a pin 54 carrying a wiper 55 coacting with the shifting cam 51 to be hereinafter described.

8 designates the member supported by the slide 5, and 9 the plunger opposed thereto. In order that the part 9 may have the same orbital and radial movements as the part 8 which is carried by the slide 5, rock arms 10, 11 are pivoted at their free ends to the parts 8, 9 respectively and have a common bearing 12 mounted on a pivot 13 spaced apart from the axis of the shaft 7 a greater dis-

tance than the path of the recorder members 8, 9 and carried by the upper ends of links 14 which are pivoted to the frame at 15 at their lower ends.

During the rotation of the body 6 and the radial movement of the slide 5, as heretofore described, the rock arm 10 will of course partake of the movement of the section 8 of the recorder and such movement will be transmitted to the arm 11 as the arm 11 is rigid with the arm 10 and both arms can reciprocate during their pivotal movement owing to the links 14.

The time movement is the prime actuator of the recording means 4. The means for actuating the recording means ahead of the prime actuator or the uniformly actuated driving member comprises a spring 16, Fig. 7, located in a suitable barrel 18 mounted on the shaft 7, one end of the spring being connected to a hub or sleeve 19 loosely mounted on the shaft 7, and the other end being connected at 20 to the barrel 18, the barrel 18 being connected to the shaft 7 to rotate the same by means of a pawl 21 carried by the barrel and coacting with a ratchet wheel 22 on a sleeve 23 which is keyed by means of a set screw 24 to the shaft 7. The sleeve 19 is provided with a suitable sprocket wheel 25 over which runs a sprocket chain 26, Fig. 1, which also coacts with a sprocket wheel 27 associated with the time movement. The time movement through the sprocket chain 26 tends to constantly tension the spring 16 which in turn tends to rotate the shaft 7. The spring 16 therefore, serves to transmit the motion of the time movement to the recording means, as well as to advance the recording means relatively to the time movement. The pawl 21 and ratchet wheel 22 permit tensioning of the spring.

The means for controlling the rotation of the recording means is actuated from the time movement, and as here shown, comprises a vertical shaft 28, Figs. 1, 2 and 4 connected to the time movement at its upper end by means of a shaft 29 coupled thereto and to the time movement, escapement members 30, 31 mounted on the lower end of the shaft 28, and a wheel 32 mounted on the shaft 7 and rotatable therewith and coacting with the escapement. The wheel 32 is here shown as provided with a series of peripheral teeth 33 and a peripheral blank 34, and the members 30, 31 are here shown as disks having notches 35, 36, Fig. 6, arranged out of alinement, the notches being wide enough to permit the teeth 33 to pass therethrough. As the notches are out of alinement, the teeth will pass through one of the notches 35 of the upper disk when said notch registers therewith and will be stopped by the portion between two of the notches 36 of the lower disk 31 until the lower disk 31 advances far enough to register a notch with said tooth whereupon the wheel advances one tooth while another tooth engages the disk 30 between two of the notches 35. Consequently, when the blank 34 registers with the disks 30, 31, the wheel 32, and consequently the marker, will make an advance equal to the number of teeth that could be contained in said blank. But means is provided for determining when the start of said advance takes place and for limiting this advance independently of the escapement and for holding the wheel 32 in its advanced position until the escapement has made a predetermined number of operations, that is, until the time movement or other prime mover has caught up with the wheel 32 and the normal synchronism of the parts is restored. This means consists of a spring pressed detent 37, Fig. 4, having a bearing 37^a mounted on a shaft 38 supported by the frame, the detent having a shoulder 39 coacting with laterally projecting shoulders 40, 41 on the wheel 32. A spring 37′ normally holds the detent in position to engage the shoulder 40 as the shoulder 40 approaches the position shown in Fig. 4. Said spring 37′ encircles the bearing 37^a and is anchored at one end to the frame and is connected at its other end to the detent 37.

The means for operating the detent 37 is controlled by the time movement and includes a wheel 42 mounted on a shaft 43 suitably supported in the frame, the wheel having adjustable points or trippers 44, 45, arranged thereon to engage a rock arm 46, Figs. 2 and 4, mounted on the bearing 37^a on which the pawl 37 is mounted.

The wheel 42 is connected to the time movement to rotate once in 24 hours and is provided with suitable graduations thereon to determine the placing of the trippers 44, 45 so that they will act at the time desired. There are two pairs of trippers 44, 45, for a purpose to be hereinafter explained. When the first tripper 44 engages the arm 46 and lifts the detent 37 out of engagement with the shoulder 40, the wheel 32 rotates in advance of the prime mover until the shoulder 41 engages the detent, the detent having been pressed by its spring 37′ into position to engage said shoulder 41; and said detent then holds the wheel 32 from movement until the tripper 45 engages the arm 46, whereupon the wheel 32 is actuated one step so that the shoulder 41 passes the shoulder 39 and the remainder of the movement of the wheel 32 is a step movement controlled by the escapement members 30, 31.

The wheel 32 makes a complete revolution by the time the second pair of trippers 44, 45, come into position to engage the detent 37. The shaft 7 makes a rotation once every 6 hours while the shaft 42 rotates once in 24 hours. The shaft 43 is actuated from the escapement shaft 28 by means of a worm

47 mounted on the shaft 28 and meshing with a worm gear 48 mounted on the shaft 43, see Figs. 1, 2 and 4.

The means for effecting the radial movement of the recorder members 8, 9, comprises a part or cam 49, Figs. 2 and 3 loosely mounted on the shaft and connected to the recorder member or body 6 to normally rotate therewith, and means for holding the cam from rotation with the recorder at predetermined points usually when the wheel 32 and the recorder are making their long advance step, as when the blank portion 34 of the wheel 32 registers with the escapement members 30, 31. The cam 49 is here shown as mounted on the shaft 7 in the rear of the guide or body 6.

As here shown, the cam 49 is formed with a plurality of high and low points 50, 51 on its periphery, each of these points having depressions or seats, and a roller or wiper 52 projects rearwardly from the slide 5 and engages the periphery of the cam 49 and is normally located in one of the seats at a high or low point 50 or 51. The slide is pressed in one direction by a spring 53, Fig. 2, which normally tends to hold the wiper 52 against the cam 49 and to cause the wiper to impositively or yieldingly lock the slide to the cam. The wiper 52 is mounted upon a pin 54 projecting from the slide 5 through a slot 55 in the bottom of the body 6, and the spring 53 is located in a recess 56 in the slide 5 and abuts at one end against one end of the recess and at its other end against an abutment 57 carried by the body 6. The pin 54 extends through the bottom of the channel of the body 6 in which the slide 5 is located and the wiper 52 mounted on the pin serves to normally hold the slide 5 at one end from detachment. The other end of the slide is secured in the channel by means of the arm 10 of the U-shaped support. The pin 54 coacting with the end walls of the slot 54 as well as the arm 10 holds the slide from moving endwisely out of the channel of the body 6.

The means for holding the cam 49 from rotation includes a detent 59, Fig. 3, mounted on the shaft 38 and having a hook 60 arranged to be moved into the path of shoulders 61 provided on the cam 49 and paired with the high and low points thereof. The shaft 38 is a rock shaft supported in the frame 3 and is provided with a rock arm 62 located contiguous to the rock arm 46 in position to be engaged by the trippers 44 of the wheel 42. Said detent 59 is acted on by the spring 38′ in a direction opposite to that in which the spring 37′ acts on the detent 37 and hence, the detent 59 is normally held out of operative position by the spring 38′. The trippers 44 are of double width and the trippers 45 are of single width, see Fig. 5. In operation, when the tripper 44 engages both rock arms 46 and 62, it moves the detent 59 into operative position so that the cam 49 is held from rotation with the shaft 7 and hence as the body or guide 6 of the recording means rotates with the shaft 7, the roller 52 moves therewith over the periphery of the cam from a low point to a high point, or from a high point to a low point, and hence the slide 5 and parts attached thereto are shifted radially in one direction or the other. After the shifting, the spring 38′ moves the pawl 59 out of operative position, and as before stated, the detent 37 is moved into operative position by its spring. As the tripper 45 moves toward the rock arms 46 and 62, it engages only the rock arm 46 to release the detent 37 from the shoulder 41 as said tripper 45 is of single width only.

The card receiver 63 is located between the arms 10 and 11, this card receiver consisting of opposing vertical plates spaced apart to form a slot for the card, and the plates are formed with alined circular openings 64. The plunger or punch 9 which forms part of the recorder is carried by the arm 11, and is normally held in its retracted position by a spring 65 on the outer end of the plunger, said end projecting to the front of the arm 11; and means is provided for operating the punch in any position of the recorder members 8, 9.

In this embodiment of my invention, this operating means consists of a plate 66 movable flatwise toward and from the card receiver to operate the member 9, by means of a hand lever 67. Said hand lever is located on one side of the machine and is mounted at its rear end on a rock shaft 68 having rock arms 69, 70 thereon, Figs. 1 and 2, which are connected to the rear ends of links 71, 72, the front ends of which are pivoted at 73, 74 to upwardly extending arms 75, 76, mounted on a horizontal rock shaft 77 journaled in the frame, the pivots 73, 74 being trunnions projecting laterally from brackets or flanges 78 on the plate 66. Obviously, when a card is in the receiver and the lever 67 is depressed, the punch 9 will be pressed inwardly and will perforate the card.

As seen in Fig. 8, the card is formed with a circular chart representing 6 hours and the morning hours are designated by numerals on the outside of the chart while the numbers representing the afternoon hours are on the inside of the chart.

In operation, assuming that a regular work period is from 7 a. m. until 12 noon, and from 1 p. m. to 5 p. m., and that a workman enters before 7 o'clock, say within three-quarters of an hour before 7, the perforation will be made at 7 o'clock as the mechanism is adjusted in this embodiment of my invention so that the wheel 32 and the

recorder members 8, 9, are advanced, owing to the blank 34, ahead of the time movement to set and hold the recorder at 7 o'clock until the time movement and mechanism actuated directly thereby have caught up with the recorder members, whereupon the wheel 32 advances at regular intervals until noon when the detent 37 engages the shoulder 40 and holds the wheel 32 and recorder from advancing until the clock registers, say 12.15, whereupon the detent 37 is released by the tripper 44 as previously described and the wheel 32 and recorder advance to carry the recorder in position opposite the afternoon entering time as 1 p. m., the detent 37 engaging the shoulder 41 when the recorder is in this position.

During this advance movement of the wheel 32 and recorder, the tripper 44 also engages the rock arm 62 which moves the detent 59 into engagement with one of the shoulders 61 on the cam 49 causing the cam to remain stationary so that the recorder slide 5 is shifted inwardly radially as the roller 52 rides from the low point to the high point of the cam. Hence the recorder members 8, 9 are shifted radially toward the axis of the shaft 7 into position to make the afternoon records.

The spring 38' immediately moves the detent 59 out of operative position after the radial shifting of the recorder but the detent 37 remains engaged with the shoulder 41 until depressed by the tripper 45 at 1 o'clock, whereupon the regular rotation or feeding movement of the wheel 32 and recorder begins and continues until 5 o'clock when the detent 37 again engages the shoulder 40 and holds the recorder from rotation.

Thereafter, all the "out" registrations will be opposite the 5 o'clock numeral on the card irrespective of how late after 5 p. m. up to three-quarters of an hour, or other period, the record is made.

The trippers 44 and 45 must be adjusted for different lengths of work days and the object of having all the perfect records in exactly the same place is that when the perforated card is placed in a computing machine, forming the subject matter of another application, the operations of which machine are governed by the positions of the perforations, an accurate computation of the time used by the workman will be made. Any late or irregular registrations will be made on the card while the recorder and wheel 32 are being actuated regularly by the escapement.

Having thus fully described my invention, what I claim is:—

1. In a recording machine, the combination of a recorder and a driving mechanism therefor, the latter including an element moving substantially uniformly, the recorder and said driving element moving substantially uniformly in normal feeding relation during a portion of the cycle of movement of the recorder, and thereafter the recorder moving relatively to said driving element to a point in advance of the position it would then have assumed had it continued in said feeding relation, and means for automatically controlling at regular intervals the movement of the recorder uniformly with the driving element and relatively to the driving element, substantially as and for the purpose described.

2. In a recording machine, the combination of a recorder and a driving mechanism therefor, the latter including an element moving substantially uniformly, the recorder and the driving element moving substantially uniformly in normal feeding relation during a portion of the cycle of movement of the recorder, the recorder then ceasing its movement in normal feeding relation with the driving element, the driving element then advancing relatively to the recorder, the recorder then moving relatively to the driving element to a point in advance of the position it would then have assumed had it continued in said feeding relation, the driving element thereafter advancing relatively to the recorder until said feeding relation of the recorder and the driving element is reëstablished, and thereupon the recorder and the driving element continuing in normal feeding relation during the balance of the cycle of movement of the recorder, substantially as and for the purpose specified.

3. In a recording machine, the combination of a recorder advancing a plurality of short steps and thereafter a long step in substantially the same time as each short step, and a driving mechanism including an element moving substantially uniformly and advancing in normal feeding relation with the recorder while the same is advancing in short steps, the driving element, after the long step of the recorder, advancing relatively to the recorder until said feeding relation between the driving element and the recorder is reëstablished, substantially as and for the purpose set forth.

4. In a recording machine, the combination of a recorder and a driving mechanism therefor, the latter including an element advancing substantially uniformly, the recorder successively advancing relatively to the driving element a plurality of short steps and a long step, and the driving element advancing relatively to the recorder after each step thereof, and for a longer time equal to the number of short steps contained in the long step after said long step than after one of such short steps, substantially as and for the purpose described.

5. In a manually operated recording machine, the combination with a recorder and

a driving mechanism therefor, the latter including an element advancing substantially uniformly, and the recorder, during a portion of its cycle of movement, advancing relatively to the driving element; of time-controlled means for controlling the advance of the recorder, said means being independent of the manually movable parts of the recording machine and being movable by the driving mechanism, substantially as and for the purpose specified.

6. In a recording machine, the combination with a recorder and a driving mechanism therefor, the latter including an element advancing substantially uniformly, and the recorder, during a portion of its cycle of movement, advancing relatively to the driving element, and the driving element advancing relatively to the recorder after said advance of the recorder; of time-controlled means for controlling the advance of the recorder, substantially as and for the purpose set forth.

7. In a recording machine, the combination with a recorder and a driving mechanism therefor, the latter including an element advancing substantially uniformly, and the recorder advancing relatively to the driving element a plurality of short steps and a long step, and the driving element advancing relatively to the recorder after each step of the latter; of time-controlled means for controlling the advances of the recorder, substantially as and for the purpose described.

8. In a recording machine, the combination with a recorder and a driving mechanism therefor, the latter including an element moving substantially uniformly, the recorder advancing in normal feeding relation with the driving element during a portion of its cycle of movement, and thereafter advancing relatively to the driving element, and said driving element advancing relatively to the recorder after the advance of the latter; of means for holding the recorder preliminary to its advance relatively to the driving element, substantially as and for the purpose specified.

9. In a recording machine, the combination with a recorder and a driving mechanism therefor, the latter including an element moving substantially uniformly, the recorder advancing a plurality of short steps in normal feeding relation with the driving element, and thereafter advancing a long step relatively to the driving element, and said driving element advancing relatively to the recorder after the long step thereof; of means for holding the recorder preliminary to its long step, substantially as and for the purpose set forth.

10. In a recording machine, the combination with a recorder and a driving mechanism therefor, the latter including an element moving substantially uniformly, the recorder advancing in normal feeding relation with the driving element during a portion of its cycle of movement, and thereafter advancing relatively to the driving element, and said driving element advancing relatively to the recorder after said advance of the latter; of means for holding the recorder during said advance of the driving element, substantially as and for the purpose described.

11. In a recording machine, the combination with a recorder and a driving mechanism therefor, the latter including an element moving substantially uniformly, the recorder advancing in normal feeding relation with the driving element during a portion of its cycle of movement, and thereafter advancing relatively to the driving element, and said driving element advancing relatively to the recorder after the advance of the latter; of means for holding the recorder preliminary to its advance relatively to the driving element and for holding the recorder during said advance of the driving element, substantially as and for the purpose specified.

12. In a recording machine, the combination with a recorder and a driving mechanism therefor, the latter including an element moving substantially uniformly, the recorder advancing a plurality of short steps in normal feeding relation with the driving element, and thereafter advancing a long step relatively to the driving element, and said driving element advancing relatively to the recorder after the long step thereof; of means for holding the recorder from advancing before and after its long step, substantially as and for the purpose set forth.

13. In a recording machine, the combination with a recorder member advancing in steps of different character in its cycle of movement; of means for controlling one character of the steps of the recorder member, and means operating independently of the former means for controlling another character of the steps of said recorder member, substantially as and for the purpose described.

14. In a recording machine, the combination with a recorder advancing a plurality of short steps and a long step in its cycle of movement; of means for controlling the short steps of the recorder, and means operating independently of the former means for controlling the long step of the recorder, substantially as and for the purpose specified.

15. In a recording machine, the combination with a recorder advancing a plurality of short steps and a long step in its cycle of movement; of means for holding the recorder before and after its short steps, and means operating independently of the for-

mer means for holding the recorder before and after its long step, substantially as and for the purpose set forth.

16. In a recording machine, the combination with a recorder and a driving mechanism therefor, the recorder advancing a plurality of short steps and a long step in its cycle of movement; of means for controlling the short steps of the recorder, means operating independently of the former means for controlling the long step of the recorder, and means connected with the driving mechanism and operating both of the controlling means, substantially as and for the purpose described.

17. In a recording machine, the combination with a recorder and a driving mechanism therefor, the latter including an element moving substantially uniformly, the recorder advancing a plurality of short steps in normal feeding relation with the driving element, and thereafter advancing a long step relatively to the driving element, and said driving element advancing relatively to the recorder after the long step thereof; of means for controlling the short steps of the recorder, means operating independently of the former controlling means for controlling the long step of the recorder, and means connected to the driving mechanism for operating both of said controlling means, substantially as and for the purpose specified.

18. In a recording machine, the combination of a recorder and a driving mechanism therefor, the latter including an element advancing substantially uniformly, and the recorder advancing relatively to the driving element a plurality of short steps and a long step, and the driving element advancing relatively to the recorder after each step of the latter, and said driving mechanism also including automatically operating means for effecting the advance steps of the recorder, substantially as and for the purpose set forth.

19. In a recording machine, the combination of a recorder and a driving mechanism therefor, the latter including an element advancing substantially uniformly, and the recorder advancing relatively to the driving element a plurality of short steps and a long step, and the driving element advancing relatively to the recorder after each step of the latter, and said driving mechanism also including a spring interposed between the recorder and the driving element and serving to automatically advance the recorder relatively to said element, substantially as and for the purpose described.

20. In a recording machine, the combination with a recorder and a driving mechanism therefor, the latter including an element moving substantially uniformly, the recorder, during a portion of its cycle of movement, advancing relatively to the driving element, and said driving element advancing relatively to the recorder after the advance of the latter; of means for holding the recorder preliminary to its advance relatively to the driving element, and means operated by the driving mechanism for controlling the advance of the recorder and the operation of the holding means, substantially as and for the purpose specified.

21. In a recording machine, the combination with a recorder and a driving mechanism therefor, the latter including an element moving substantially uniformly, the recorder advancing a plurality of short steps in normal feeding relation with the driving element, and thereafter advancing a long step relatively to the driving element, and said driving element advancing relatively to the recorder after the long step thereof; of means for holding the recorder from advancing before and after its long step, and means operated by the driving mechanism for controlling the advances of the recorder and the operation of the holding means, substantially as and for the purpose set forth.

22. In a manually operated recording machine, the combination with a recorder and a driving mechanism therefor, the latter including a movable element connected to transmit motion to the recorder, and the recorder, during a portion of its cycle of movement, advancing relatively to the driving element, and said driving mechanism also including automatically operating means for effecting said advance of the recorder, such means being independent of the manually movable parts of the recording machine; of time controlled means for controlling the advance of the recorder, substantially as and for the purpose described.

23. In a recording machine, the combination with a recorder and a driving mechanism therefor, the latter including an element advancing substantially uniformly, and the recorder advancing relatively to the driving element a plurality of short steps and a long step, and the driving element advancing relatively to the recorder after each step of the latter, and said driving mechanism also including means interposed between the recorder and the driving element and serving to automatically advance the recorder relatively to said element; of time controlled means for controlling the advances of the recorder, substantially as and for the purpose described.

24. In a recording machine, the combination with a recorder and a driving mechanism therefor, the recorder advancing in steps of different character in its cycle of movement, and the driving mechanism including an element moving substantially

uniformly, the recorder moving relatively to the driving element while making one character of its steps, and said driving mechanism also including automatically operating means for effecting one of said character of steps of the recorder; of means for controlling one character of the steps of the recorder, and additional means for controlling another character of the steps of the recorder, substantially as and for the purpose specified.

25. In a recording machine, the combination with a recorder and a driving mechanism therefor, the latter including an element advancing substantially uniformly, the recorder advancing relatively to the driving element a plurality of short steps and a long step, and the driving element advancing relatively to the recorder after each step of the latter, and said driving mechanism also including means interposed between the recorder and the driving element and serving to automatically advance the recorder relatively to said element; of means for controlling the short steps of the recorder, means operating independently of the former controlling means for controlling the long step of the recorder, and means for operating both of said controlling means, substantially as and for the purpose set forth.

26. In a recording machine, the combination of a recorder, driving mechanism for the recorder, a uniformly actuated governing means coacting with the recorder and operating to successively release and restrain the recorder to permit it to take a plurality of short steps in synchronism with the governing means and to thereafter release the recorder to permit it to take a long step relatively to the governing means, said governing means being movable independently of the recorder after the long step thereof, and means for holding the recorder in its position assumed after its long step until the governing means has operated to an extent corresponding to the long step of the recorder, substantially as and for the purpose described.

27. In a recording machine, the combination of a recorder, driving mechanism for the recorder, a uniformly actuated governing means coacting with the recorder, and operating to successively release and restrain the recorder to permit it to take a plurality of short steps in synchronism with the governing means and to thereafter release the recorder to permit it to take a long step relatively to the governing means, said governing means being movable independently of the recorder after the long step thereof, and means for holding the recorder from movement when released by the governing means before the long step, for thereafter releasing the recorder to take its long step, and for holding the recorder after its long step until the governing means has operated to an extent corresponding to the long step of the recorder, substantially as and for the purpose specified.

28. In a recording machine, the combination of a recorder, driving mechanism for the recorder, a uniformly actuated escapement successively releasing and restraining the recorder and thereby dividing a portion of the advance movement of the recorder into a number of short steps, means releasing the recorder from the escapement to permit the recorder to make a long step, and means for holding the recorder from actuation after its long step while the escapement completes a number of operations corresponding to the long step of the recorder, substantially as and for the purpose set forth.

29. In a recording machine, the combination with a recorder and driving mechanism therefor; of a wheel movable with the recorder and formed with a series of teeth and with a blank between two of the teeth exceeding in length regular spaces between the teeth, a uniformly actuated escapement coacting with the teeth to divide a portion of the advance movement of the recorder into a number of short steps, the blank causing the escapement to permit the wheel to make a long step when said blank is registered with the escapement, and means for holding the wheel from advancing after its long step until the escapement has made a number of operations corresponding to said blank, substantially as and for the purpose described.

30. In a recording machine, the combination with a recorder and driving mechanism therefor; of means controlling the movement of the recorder during a portion of its cycle of movement, said means comprising a wheel moving with the recorder and formed with a shoulder, a pivoted detent coacting with said shoulder, and time controlled means for operating the detent, and means for controlling the movement of the recorder during the balance of its cycle of movement, substantially as and for the purpose specified.

31. In a recording machine, the combination with a recorder and driving mechanism therefor; of means controlling the movement of the recorder during a portion of its cycle of movement, said means comprising a wheel moving with the recorder and formed with spaced apart shoulders, a pivoted detent coacting with the shoulders, and time controlled means for operating the detent, and means for controlling the movement of the recorder during the balance of its cycle of movement, substantially as and for the purpose set forth.

32. In a recording machine, the combina-

tion with a recorder and driving mechanism therefor; of means controlling the movement of the recorder during a portion of its cycle of movement, said means comprising a wheel moving with the recorder and formed with spaced apart shoulders, a pivoted detent coacting with the shoulders, and time controlled means for operating the detent comprising a rotating wheel and spaced apart trippers adjustably carried by the wheel and successively coacting with the detent, and means for controlling the movement of the recorder during the balance of its cycle of movement, substantially as and for the purpose described.

33. In a recording machine, the combination of a driving mechanism, a recorder actuated by the driving mechanism and movable in uniform and nonuniform steps during its cycle of movement, means for controlling the uniform steps of the recorder, additional means for controlling the nonuniform steps of the recorder, and a time controlled member connected to both of the controlling means and to the driving mechanism, substantially as and for the purpose set forth.

34. In a recording machine, the combination with a recorder and driving mechanism therefor; of rotating means movable with the recorder and formed with teeth, a uniformly actuated escapement coacting with the teeth to divide a portion of the cycle of movement of the recorder into a number of short steps, means releasing the rotating means from the escapement to permit the recorder to make a long step during another portion of said cycle, and a detent coacting with said rotating means for holding the recorder from advancing after its long step until the escapement has made a number of operations corresponding to said long step, substantially as and for the purpose described.

35. In a recording machine, the combination with a recorder and driving mechanism therefor; of a wheel movable with the recorder and formed with a series of teeth and with a blank between two of the teeth exceeding in length regular spaces between the teeth, a uniformly actuated escapement coacting with the teeth to divide a portion of the advance movement of the recorder into a number of short steps, the blank causing the escapement to permit the wheel to make a long step when said blank is registered with the escapement, and a detent coacting with the wheel for holding it from advancing after its long step until the escapement has made a number of operations corresponding to said blank, substantially as and for the purpose specified.

36. In a recording machine, the combination with a recorder and driving mechanism therefor; of rotating means movable with the recorder and formed with teeth and with a pair of spaced apart shoulders, a uniformly actuated escapement coacting with the teeth to divide a portion of the cycle of movement of the recorder into a number of short steps, means releasing the rotating means from the escapement to permit the recorder to make a long step during another portion of said cycle, and a detent coacting with said shoulders for holding the recorder at the beginning and end of its long step, substantially as and for the purpose set forth.

37. In a recording machine, the combination with a recorder and driving mechanism therefor, the latter including a shaft; of rotating means movable with the recorder and formed with teeth, a uniformly actuated escapement coacting with the teeth to divide a portion of the cycle of movement of the recorder into a number of short steps, means releasing the rotating means from the escapement to permit the recorder to make a long step during another portion of said cycle, a detent coacting with said rotating means for holding the recorder from advancing after its long step until the escapement has made a number of operations corresponding to said long step, and driving connections from said shaft to the escapement and the detent for operating the same, substantially as and for the purpose described.

38. In a recording machine, the combination with a recorder and driving mechanism therefor; of rotating means movable with the recorder and formed with teeth, a uniformly actuated escapement coacting with the teeth to divide a portion of the cycle of movement of the recorder into a number of short steps, means releasing the rotating means from the escapement to permit the recorder to make a long step during another portion of said cycle, a detent coacting with said rotating means for holding the recorder from advancing after its long step until the escapement has made a number of operations corresponding to said long step, and time controlled means for operating the escapement and the detent, said means comprising a rotating wheel, and means adjustably mounted on the wheel for coacting with the detent, substantially as and for the purpose specified.

39. In a recording machine, the combination with a recorder and driving mechanism therefor; of a wheel movable with the recorder and formed with a series of teeth and with a blank between two of the teeth exceeding in length regular spaces between the teeth, a uniformly actuated escapement coacting with the teeth to divide a portion of the advance movement of the recorder

into a number of short steps, the blank causing the escapement to permit the wheel to make a long step when said blank is registered with the escapement, and time controlled means for operating the escapement and the detent, said means comprising a rotating wheel and spaced apart trippers adjustably carried by the wheel and successively coacting with the detent, substantially as and for the purpose set forth.

40. The combination of a recorder member having a movement about an axis, a second member pivotally connected to the first member eccentric to said axis, a punching tool carried by the second member, and traveling means for supporting the second member at a point spaced apart from the axis of said pivotal connection, substantially as and for the purpose described.

41. The combination of a recording element comprising a part having a movement about an axis, a member movable with said part about its axis and shiftable relatively to said axis, a second member pivotally connected to the first member eccentric to said axis, and a punching tool supported at approximately the pivotal connection between the first and second members, substantially as and for the purpose specified.

42. The combination of a recording element comprising a member having a movement about an axis, a second member movable with the first member about its axis and shiftable relatively to said axis, a third member pivotally connected to the second member eccentric to said axis, a punching tool carried by the third member, a support fixed from movement with the first member, and a fourth member pivotally connected to the support and pivotally connected to the third member at a point spaced apart from the axis of said pivotal connection, substantially as and for the purpose set forth.

43. The combination of a recording element comprising a member having a movement about an axis, a second member movable with the first member about its axis and shiftable relatively to said axis, a third member pivotally connected at one end to the second member eccentric to said axis, a punching tool carried by said end of the third member, a support fixed from movement with the first member, and a fourth member pivotally connected to the support and pivotally connected to the other end of the third member, substantially as and for the purpose described.

44. The combination of a recording element comprising a part having a movement about an axis, a first member pivotally connected to said part eccentric to said axis, a punching tool carried by the first member, a support fixed from movement with said part, and a second member pivotally connected to the support and pivotally connected to the first member at a point spaced apart from the axis of the pivotal connection of said part and the first member, a distance greater than the diameter of the path of the punching tool about the first-mentioned axis, substantially as and for the purpose specified.

45. The combination of a recording element comprising a member having a movement about an axis, a second member pivotally connected to the first member eccentric to said axis, a punching tool carried by the second member in substantially axial alinement with the axis of the pivotal connection between the first and second members, and means for supporting the second member at a point spaced apart from the axis of said pivotal connection, substantially as and for the purpose set forth.

46. The combination of a recording member having a movement about an axis, a substantially U-shaped member having one arm pivotally connected to the first member eccentric to said axis and movable in a plane parallel to the plane of movement of the recorder member and having the opening of the U-shaped member arranged to receive a card in position parallel to the plane of movement of the recorder member, and a punching tool carried by the other arm of the second member, substantially as and for the purpose described.

47. The combination of a recorder member having a movement about an axis, a substantially U-shaped member having one arm pivoted at its free end to the first member eccentric to said axis and movable in a plane parallel to the plane of movement of the recorder member and having the opening of the U-shaped member arranged to receive and hold a card in a position in front of and parallel to the plane of movement of the recorder member, a punching tool carried by the free end of the other arm of the second member, and means for pivotally supporting the intermediate part of the second member, substantially as and for the purpose specified.

48. The combination of a recording mechanism comprising a member having a movement about an axis, a second member movable with the first member about its axis, and shiftable relatively to said axis, a third member pivotally connected to the second member eccentric to said axis, a punching tool carried by the third member at approximately the pivotal connection between the second and third members, a support fixed from movement with the first member, and a fourth member pivotally connected to the support and pivotally connected to the third member at a point spaced apart from the axis of the pivotal connection of the sec-

ond and third members, a distance greater than the diameter of the path of the punching tool about the first-mentioned axis, substantially as and for the purpose set forth.

49. In a recording machine, the combination of a movable member, a second member movable with the first member and movable relatively thereto, and a recorder comprising two members movable with the second member, one of the recorder members being movable toward and from the other, substantially as and for the purpose described.

50. In a recording machine, the combination of a member having a movement about an axis, a second member pivotally connected to the first member eccentric to said axis, and a recorder comprising two members movable with the second member, one of the recorder members being movable toward and from the other, substantially as and for the purpose specified.

51. In a recording machine, the combination of a movable member, a second member movable with the first member and movable relatively thereto, the second member having a card passage therein arranged to receive a card in a position parallel to the path of movement of the first and second members in any position of said first and second members, and a recorder comprising two members arranged at opposite sides of the passage and movable with the second member, one of the recorder members being movable relatively to the other, substantially as and for the purpose specified.

52. In a recording machine, the combination of a movable member, a second member movable with the first member and movable relatively thereto, a third member movably connected with the second member and including a card passage, and a recorder comprising opposing coacting members arranged at opposite sides of the passage, substantially as and for the purpose set forth.

53. In a recording machine, the combination of a member having a movement about an axis, a substantially U-shaped member having one arm pivotally connected to the first member eccentric to its axis, and a recorder comprising opposing coacting members carried respectively by the arms of the second member, substantially as and for the purpose described.

54. In a recording machine, the combination of a member having a movement about an axis, a substantially U-shaped member having one arm pivotally connected to the first member eccentric to its axis, a recorder comprising opposing coacting members carried respectively by the arms of the second member, and means for supporting the second member at a point spaced apart from the axis of said pivotal connection, substantially as and for the purpose specified.

55. In a recording machine, the combination of a member having a movement about an axis, a member having a passage and arms at opposite sides of the passage, and a recorder comprising two coacting members, one pivotally connecting the first and second members, and the other being arranged in substantially axial alinement with the pivotal connection between the first and second members, substantially as and for the purpose set forth.

56. In a recording machine, the combination of a member movable in a path and a recorder movable with said member in said path and shiftable relatively thereto in a direction crosswise of said path, shifting means comprising a part normally movable with the supporting member, means for holding at intervals said part from movement with the supporting member and a carrier movable with the supporting member and coacting with said part of the shifting means in order to be moved during the movement of the supporting member when the shifting part is held from movement, substantially as and for the purpose described.

57. In a recording machine, the combination with a revoluble member and a recorder revoluble with the member and shiftable radially relatively thereto; of shifting means comprising a cam revoluble with the member, means for holding the cam from revoluble movement with the member, and a part connected to the recorder and coacting with the cam when held from movement with the revoluble member and thereby shifting the recorder, substantially as and for the purpose specified.

58. In a recording machine, the combination with a revoluble member, a recorder carrying member arranged at one side of the revoluble member and revoluble therewith and shiftable relatively thereto in a direction at an angle to its path of travel during rotation thereof, and a recorder carried by the carrying member; of shifting means comprising a part arranged at the opposite side of the revoluble member and movable therewith, means for holding said part from movement with the revoluble member, and a part connected to the carrying member and coacting with said part of the shifting means when held from movement with the revoluble member and thereby shifting the recorder, substantially as and for the purpose set forth.

59. In a recording machine, the combination with a revoluble member, a recorder carrying member revoluble with the first member and shiftable radially relatively thereto, and a recorder carried by one end of the recorder carrying member; of shifting means comprising a part revoluble with

the revoluble member, means for holding said part from revoluble movement with the revoluble member, and means connected to the other end of the recorder carrying member and coacting with said part of the shifting means when held from movement with the revoluble member and thereby shifting the recorder carrying member, substantially as and for the purpose described.

60. In a recording machine, the combination with a revoluble member, a recorder carrying member revoluble with the revoluble member and shiftable radially relatively thereto, and a recorder carried by said carrying member; of shifting means comprising a cam revoluble with the first member, means for holding the cam from revoluble movement with the revoluble member, a part connected to the carrying member and coacting with the cam for shifting the carrying member in one direction, and a spring for shifting the second member in the opposite direction, substantially as and for the purpose specified.

61. In a recording machine, the combination with a recorder advancing in steps of different character in its cycle of movement, the recorder being also movable in a direction crosswise of its direction of movement when advancing in steps of different character; of means for controlling one character of the steps of the recorder, means for controlling another character of the steps of the recorder, and means for advancing the recorder in its steps of different character and moving the recorder crosswise of its direction of movement when moving in said steps, substantially as and for the purpose set forth.

62. In a recording machine, the combination of a movable recorder having a shifting movement relatively to its advance movement, a uniformly actuated driving member connected to the recorder, means for setting the recorder ahead of the driving member, and means for effecting the shifting of the recorder, substantially as and for the purpose described.

63. In a recording machine, the combination with a recorder and a driving mechanism therefor, the latter including an element advancing substantially uniformly, and the recorder during a portion of its cycle of movement advancing relatively to the driving element, and the driving element advancing relatively to the recorder after said advance of the recorder; of means for shifting the recorder in its cycle of movement in a direction at an angle to the direction in which it moves during another portion of said cycle, and time controlled means for controlling the advance and shifting of the recorder, substantially as and for the purpose specified.

64. In a recording machine, the combination with a recorder and a driving mechanism therefor, the latter including an element advancing substantially uniformly, and the recorder advancing relatively to the driving element a plurality of short steps and a long step, and the driving element advancing relatively to the recorder after each step of the latter, and said driving mechanism also including automatically operating means for effecting the advance steps of the recorder, of means for shifting the recorder in a direction at an angle to its path of movement when making said short and long steps, substantially as and for the purpose set forth.

65. In a recording machine, the combination with a recorder, and a driving mechanism therefor, the latter including an element advancing substantially uniformly, the recorder having a shifting movement in a direction at an angle to its advance movement, and the recorder during a portion of its cycle of movement advancing relatively to the driving element; of means for effecting shifting of the recorder during its advance relatively to the driving element, substantially as and for the purpose described.

66. In a recording machine, the combination with a recorder, and a driving mechanism therefor, the latter including an element advancing substantially uniformly, and the recorder advancing relatively to the driving element a plurality of short steps and a long step and having a shifting movement in a direction at an angle to said advance movement, and the driving element advancing relatively to the recorder after each step of the latter, and said driving mechanism also including automatically operating means for effecting the advance steps of the recorder; of means for effecting the shifting of the recorder when the latter is making said long step, substantially as and for the purpose specified.

67. In a recording machine, the combination with a revoluble member, a second member revoluble with the first member and shiftable radially relatively thereto, and a recorder carried by the second member, of driving means for rotating said members and advancing the recorder in a plurality of short steps and thereafter in a long step, and means for radially shifting the second member during the long advance of the recorder, substantially as and for the purpose set forth.

68. In a recording machine, the combination with a revoluble member, a second member revoluble with the first member and shiftable radially relatively thereto, and a recorder carried by the second member, said recorder being movable by the second member into two paths and being advanced a

number of short steps and a long step in each path; of means for radially shifting the second member while the recorder is making its long advances, substantially as and for the purpose described.

69. In a recording machine, the combination of a stationary card receiver, a recorder including members movable at opposite sides of the card receiver in planes parallel to the receiver, and means for moving the member at one side of the card receiver toward and from the other member of said recorder, substantially as and for the purpose specified.

70. In a recording machine, the combination of a stationary card receiver comprising opposing plates having alined circular openings therein, and a recorder including coacting members movable in arcs at opposite sides of the card receiver, one of said members being movable toward and from the other in the circular openings, substantially as and for the purpose set forth.

71. In a recording machine, the combination of a stationary card receiver comprising opposing plates having alined circular openings therein, a recorder including coacting members movable in arcs at opposite sides of the card receiver, one of said members being movable toward and from the other in the circular openings, and means for actuating the revoluble recorder member at any point in its cycle of movement, substantially as and for the purpose described.

72. In a recording machine, the combination of a recorder movable into a number of positions, a plate for operating the recorder in said positions, and operating means for moving the plate rectilinearly into and out of position to actuate the recorder, said means consisting of a rock shaft having a pair of arms spaced apart thereon, a manually actuated member for operating the rock shaft, a second rock shaft extending substantially parallel with the plate and having a pair of arms pivotally connected to an intermediate portion of the plate, and links connecting the arms on the two rock shafts, and movable substantially rectilinearly, substantially as and for the purpose set forth.

73. In a recording machine, the combination of a stationary card receiver, a recorder including members movable on opposite sides of the card receiver, means for moving the member on one side of the card receiver toward and from the other member, and a movable substantially U-shaped supporting member embracing the card receiver and connected to the recorder members, substantially as and for the purpose described.

74. In a recording machine, the combination of a member having a movement about an axis, a stationary card receiver fixed from movement with the member and having openings in its sides, a member movable with the first member and having a passage for receiving the card receiver and arms at opposite sides of the passage movable at opposite sides of the receiver, and a recorder comprising opposing coacting members connected to the arms, substantially as and for the purpose specified.

In testimony whereof, I have hereunto signed my name in the presence of two attesting witnesses, at Syracuse, in the county of Onondaga, in the State of New York, this 18th day of January, 1915.

ALEXANDER T. BROWN.

Witnesses:
S. DAVIS,
J. GLAZIER.