

APPLICATION FILED NOV. 16, 1909.

Patented Dec. 13, 1910.

2 SHEETS—SHEET 1.

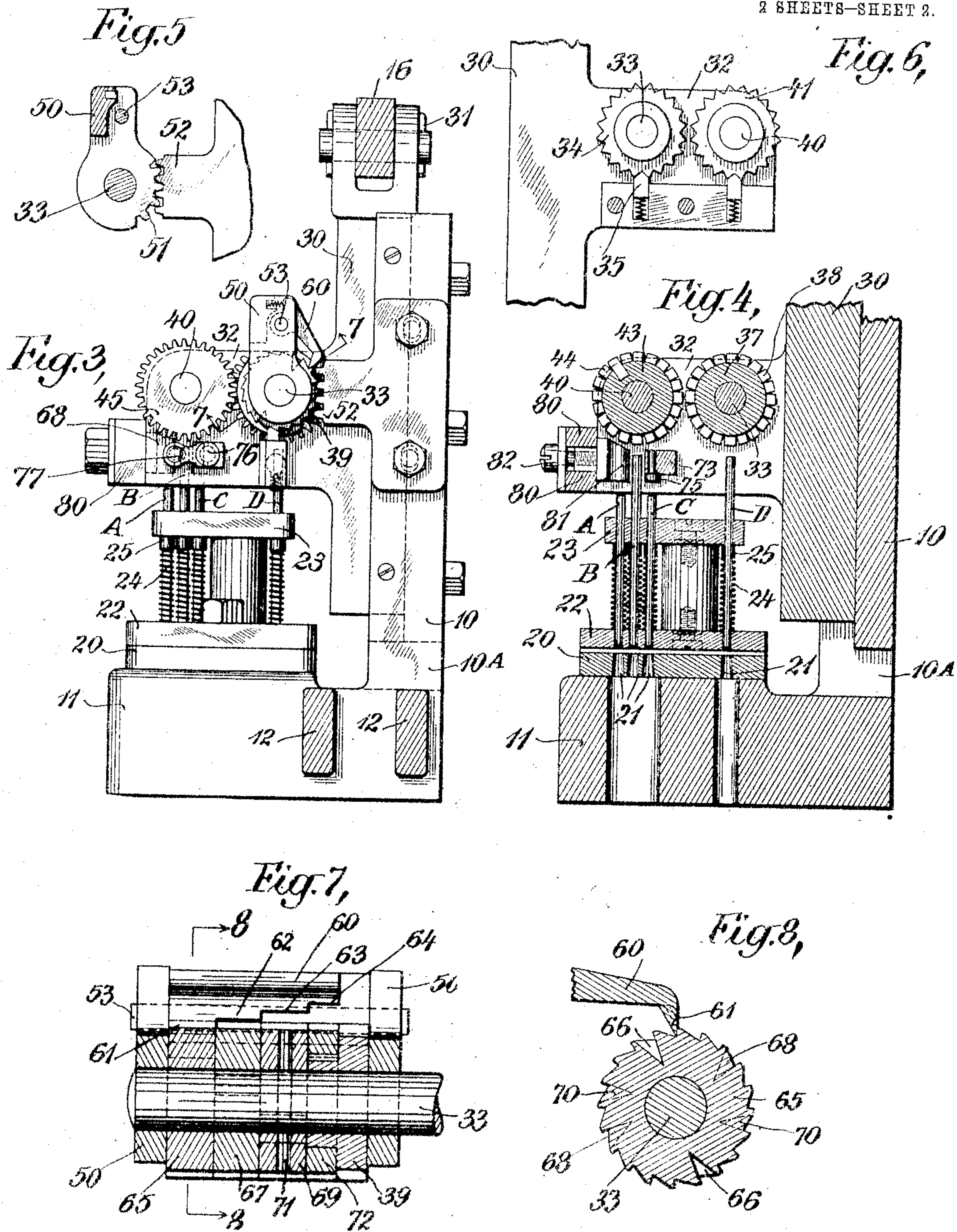
Charles O. Pearson Inventor  
By his Attorney  
E. W. Marshall



978,480.

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2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

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PERFORATING-MACHINE.

978,480.

Specification of Letters Patent.

Patented Dec. 13, 1910.

Application filed November 16, 1909. Serial No. 528,306.

To all whom it may concern:

Be it known that I, CHARLES O. PEARSON, a citizen of the United States, and a resident of the borough of Brooklyn, in the county of Kings, city and State of New York, have invented certain new and useful Improvements in Perforating-Machines, of which the following is a specification.

My invention relates to perforating machines such as are used to punch holes in cards or the like, in different positions thereon, corresponding with different numbers. For example, it may be used to perforate cards which are to be assorted or distributed by an automatic machine.

The object of my invention is to improve upon apparatus of this kind, and to provide a simple automatic machine which has decided advantages over those heretofore known in the art.

I will describe my invention in the following specification and point out the novel features thereof in the appended claims.

Referring to the drawings, Figure 1 is a front elevation of my improved perforating machine. Fig. 2 is a sectional plan view of the machine, the section being taken on the line 2—2 of Fig. 1. A portion of this figure is broken away to more clearly show the construction. In Fig. 3 I have shown the machine in side elevation, and in Fig. 4 I have shown it in sectional side elevation, with the section taken on the line 4—4 of Fig. 1. Fig. 5 is a detail of a pawl-actuating mechanism which is shown in Fig. 3, and Fig. 6 is a detail of a holding mechanism which is on the opposite side of the machine than that illustrated in Fig. 3. Figs. 7 and 8 are, respectively, a sectional elevation and a sectional end elevation of a ratchet and pawl mechanism which I use in carrying out my invention. The section in Fig. 7 is taken on the line 7—7 of Fig. 3, and that in Fig. 8 is taken on the line 8—8 of Fig. 7, looking in the direction of the arrows.

Like characters of reference designate corresponding parts in all of the figures.

10 designates the stationary frame of the machine by which its various parts are supported. 11 is its base which may be integral with the frame as shown.

12, 12 are brackets projecting from one side of the base and arranged to form bearings for a driving shaft 13.

14 is a bracket projecting from the oppo-

site side of the frame and supporting by a link 15 a lever 16 which is arranged to be reciprocated by means of an eccentric 17 keyed to the shaft 13 and connected with the outer end of lever 16 by means of an adjustable connecting rod 18.

19, 19 designate vertical guides which are affixed to and form a part of the supporting frame.

20 is a platen affixed to the base 10. This platen is provided with a plurality of openings 21 corresponding in number, size and shape with the punches which I will presently point out. The base is left open below these holes to allow the cut-out card-board or other material to fall away.

At 22 and 23 are stationary guide-yokes for holding the punches in alinement with the openings 21. These yokes also form a part of the stationary frame. The punches are designated by the letters A, B, C, and D, disposed in four parallel rows, each row comprising two sets of punches, ten in each set. Spiral springs such as 24 surround these punches and, abutting against the yoke 22 and a collar such as 25 on each punch, are arranged to maintain the punches in their raised positions in which they are shown in the drawings.

It may be seen from the drawings that cards or strips of paper or card-board may be passed between the platen 20 and the yoke 22, and through the machine when the punches are up. The frame is cut away at 10<sup>A</sup> so that it does not obstruct the passage of such material. It is the object of this invention to depress certain of these punches at each downward movement of the lever 16, and to automatically change the particular punches thus depressed at desired intervals.

A movable head 30 is connected with the lever 16 at 31. This head is supported by the frame 10 and the guides 19 so that it is moved up and down with the lever 16, but is held against lateral movement. This head has two arms or brackets 32 which support the other movable parts of the mechanism which I will now describe.

33 is a shaft rotatably supported by the arms 32. Upon one end of this shaft is affixed a star-wheel 34 with which a spring-pressed pawl 35 engages to hold the shaft against rotation when it is not acted upon by other parts of the machine. The shaft 33 is directly above and parallel with the two sets of punches designated by D. Af-



fixed to the shaft are two cylinders 36 and 37 from which project radial pins 38. Each of these pins is on a circle directly above one of the punches, but all of the pins are spaced about the cylinders in such a manner that by rotating the shaft and cylinders any one of the pins on each cylinder may be brought into vertical alinement with its respective punch. The two sets of punches with their cylinders and actuating pins are duplicates in the particular arrangement illustrated so that when one of the pins for the first punch of one set in the row designated by D is brought into alinement therewith, one of the pins for the first punch in the second set in this row will also be in operative position. It is obvious that the vertical reciprocatory movement of the head 30 will then cause two punches to be depressed and to perforate any card or paper which may be between the platen 20 and the yoke 22 at the time. A partial rotation of the shaft 33 will move the first pins away and bring the pins over the second punches in each set into operative positions. I have shown ten punches in each set and two sets of ten pins on each cylinder, so that one twentieth of a revolution of the shaft 33 will be necessary to move the pins along each step, and one half a revolution of the shaft 33 will cause all of the punches in the row D to be successively depressed. The two sets of punches designated by B are similarly actuated by pins upon cylinders above them.

40 is a shaft upon one end of which is a holding star-wheel 41.

42 and 43 are the two cylinders affixed to the shaft, and their projecting pins are designated by 44.

45 is a gear on the end of shaft 40 which is in mesh with a similar gear 39 of the same size on the end of shaft 33.

I will now describe the mechanism by means of which the shafts 33 and 40 are automatically rotated. Upon the end of shaft 33 is loosely mounted a yoke 50, one portion of which is provided with gear-teeth 51. These are in mesh with a stationary rack 52 which is affixed to the frame 10. It is evident that the vertical reciprocation of the head 30, which carries shaft 33, will cause the yoke 50 to be swung back and forth about its axis, which is the center of shaft 33.

Pivoted on a pin 53 in yoke 50 is a spring-pressed pawl 60 which is provided with a plurality of pawl surfaces or teeth 61, 62, 63 and 64 set at different heights, as shown in Fig. 7. The first of these, 61, is arranged to engage with the teeth of a ratchet-wheel 65 which is loosely mounted upon shaft 33. This wheel is provided with twenty teeth, and the movement of the pawl 60 is such as to advance the ratchet-wheel one twentieth of a revolution during each reciprocation of

the movable head 30. Diametrically opposed to each other are two notches 66 cut into the periphery of the wheel 65 between its teeth. 67 is a similar ratchet-wheel provided with the same number of teeth and with diametrically disposed notches 68. These teeth and notches are in alinement with the pawl surface 62 and are engaged thereby under certain conditions. This ratchet-wheel is also mounted loosely upon shaft 33. Another ratchet-wheel like those above described is shown at 69 in alinement with the pawl surface 63. This one is also provided with twenty teeth and two notches 70, but, unlike the others, is rigidly affixed to the shaft 33, as, for example, by means of a pin 71. 72 is still another ratchet-wheel having, like the others, twenty teeth. This one is in alinement with the pawl surface 64, but instead of being mounted loosely upon shaft 33, or affixed thereto, it is affixed to the hub of the gear 39.

I will now point out the operation of this mechanism. As the pawl 60 is reciprocated in the manner previously described, it will cause the ratchet-wheel 65 to be advanced step by step. This will continue until one of the notches 66 comes under the pawl surface 61, when the latter will drop down a sufficient amount to allow the pawl surface 62 to engage one of the teeth of the ratchet-wheel 67. As this occurs at every tenth step of advance of the wheel 65, or twice during each revolution of the latter, it may be seen that it will take ten revolutions of wheel 65 to cause wheel 67 to make one revolution. The notches 68 in wheel 67 will register with the notches 66 in wheel 65 twice during each revolution of wheel 67. When this condition is reached, the pawl will drop down far enough for the pawl surface 63 to engage one of the teeth of wheel 69 and to advance it one twentieth of a revolution. As this ratchet-wheel 69 is affixed to the shaft 33, its movement will be transmitted to the cylinders 36 and 37, and its projecting pins 38 will be advanced one step after every one hundred downward movements of the head 30. Therefore, whichever pin on cylinder 36 and pin on cylinder 37 is in actuating position at the beginning of the operation will cause its or their respective punch or punches to be depressed one hundred times and then the next successive pin or pins will be moved into position to cause the next successive punch or punches to be depressed one hundred times, *et sequa*. But the ratchet-wheel 69 is also provided with notches 70 which, after each tenth step of this wheel, will register with the notches 66 and 68, and this will allow the pawl 60 to drop down until its surface 64 engages one of the teeth of ratchet-wheel 72 and advances it and the gear 39 one twentieth of a revolution. This



will occur after each one thousand depressions of the head 30, and this movement will be transmitted through gear 45 and shaft 40 to the cylinders 42 and 43. These cylinders carry the pins 44 which actuate the punches in row B so that each of the latter punches will be depressed one thousand times before the next successive punch in each set in this row is put into operation. It is evident that this automatic advance of the punches may be similarly accomplished in multiples of ten or other desired numbers by carrying out the same mechanism, a greater number of steps. But in the particular exemplification of the invention which I have illustrated I have shown another means for advancing the operation of the punches in row C, which advance is to take place after each ten thousand depressions of the movable head. In this case a rack 73 is affixed to the arms 32 of the movable head, and this rack is provided with a plurality of holes 74, one of which is directly above each of the punches in row C. These holes are preferably numbered (in a manner not shown in the drawings) to facilitate the operation. One or more movable plugs 75 are provided which may be manually inserted in the desired holes, and the plugs are designed to depress the desired punch or punches. A handle 76 is affixed to the end of the rack 73 by means of which the rack may be pulled out from the frame so that the plugs 75 may be easily changed. 77 is a latch provided for the purpose of holding this rack in place. I have also shown a manually set arrangement for causing the desired punches in row A to be depressed. In this case a slotted bar 80 is bolted across the face of the arms 32, and adjustable dogs 81 are so arranged that they may be affixed thereto by means of screws 82 in such position that each dog will strike and depress one of the pins in row A. The front or top of the bar 80 may also be calibrated and numbered to facilitate the adjustment of the dogs 81. They may be advanced one step after each one hundred thousand depressions.

The particular machine herein illustrated and described has been built for certain requirements and is used as an attachment to a printing press for printing catalogue cards. It is a double machine and can perforate two series of cards simultaneously. It is not my intention, of course, to limit myself to the specific construction herein shown as the requirements for such machines vary so widely, but it is evident that this invention may be used to automatically change the punches in one set after each depression, or after each ten depressions, or after any desired number of depressions. The punches in one row may be changed according to one multiple, and those in another according to

another multiple. The size and shape of the punches may be varied at will and may be made to make perforations corresponding with numbers, as described, or corresponding with letters, or other symbols, if desired. It is only required that the perforations made in the cards or the like may be made in different relative positions thereon, and my invention has provided a simple and compact mechanism by means of which this result may be attained in a more simple manner and with greater accuracy and speed than has been possible with machines heretofore used.

What I claim is—

1. A row of punches, a plurality of pins spaced over the punches about an axis in alinement therewith, and means for imparting a continuous relative movement to said punches and pins.
2. A row of punches, a plurality of pins spaced over the punches about an axis in alinement therewith, means for imparting relative movement to said punches and pins, and automatic means for shifting the circumferential positions of said pins.
3. A row of punches, a cylinder in alinement therewith, pins projecting from different circumferential positions on said cylinder, and means for imparting a continuous relative movement to said punches and cylinder.
4. A row of punches, a cylinder in alinement therewith, pins projecting from different circumferential positions on said cylinder, means for imparting relative movement to said punches and cylinder, and automatic means for rotating said cylinder desired amounts.
5. A row of punches, a cylinder in alinement therewith, a plurality of pins corresponding in number with the number of said punches, said pins being spaced spirally about said cylinder and projecting radially therefrom, and means for rotating said cylinder in a plurality of steps.
6. A plurality of punches arranged in a straight line, a reciprocatory member, and a plurality of pins carried by said member, each of said pins being in alinement with one of the punches, and all of the pins being spaced spirally about an axis parallel with the punches.
7. A plurality of punches arranged in a straight line, a reciprocatory member, a plurality of pins carried by said member, each of said pins being in alinement with one of the punches, and all of the pins being spaced about an axis parallel with the punches, and means actuated by the reciprocation of said member for shifting the positions of the pins.
8. A plurality of punches arranged in a straight line, a cylinder with its axis parallel with said line, means for reciprocating



said cylinder toward and from the punches, a plurality of pins spaced spirally about said cylinder and projecting radially therefrom, and means actuated by the reciprocation of the cylinder for rotating said cylinder in a plurality of steps.

9. A plurality of punches set on a straight line, a cylinder with its axis parallel with said line, means for reciprocating said cylinder toward and from the punches, a plurality of pins spaced spirally about said cylinder and projecting radially therefrom, and automatic means actuated by the reciprocation of the cylinder for rotating said cylinder in a plurality of steps at desired intervals.

10. A plurality of punches set on a transverse straight line, a continuously reciprocating member parallel with said line arranged to actuate any desired one or more of said punches, and means for moving said member into different operative positions to cause it to actuate others of the punches.

11. A plurality of punches set on a transverse straight line, a reciprocatory cylinder with its axis parallel with said line, a plurality of pins projecting radially from said cylinder arranged to actuate any desired one or more of said punches at once, and means for imparting a partial rotation to said cylinder at desired intervals to cause said pins to actuate others of the punches.

12. A plurality of sets of punches disposed in a single row, a plurality of pins spaced over the punches about an axis parallel with said row, means for imparting relative movement to said punches and pins to cause certain of said pins to actuate desired punches in each set, and means for shifting the circumferential positions of the pins to cause others of the pins to actuate others of the punches.

13. A plurality of sets of punches disposed in a single row, a shaft with its axis parallel with said row, a plurality of cylinders upon said shaft, one of the cylinders being over each of said punches, pins projecting from different circumferential positions on said cylinders, means for imparting relative movement to said punches and cylinders, and means for rotating the cylinders in a plurality of steps corresponding with the positions of the pins thereon.

14. A plurality of sets of punches disposed in a single row, a shaft with its axis parallel with said row, a plurality of cylinders upon said shaft, one of the cylinders being over each set of punches, means for reciprocating said shaft toward and from the punches, a plurality of pins on each cylinder corresponding in number with the number of punches in each set, said pins being spaced parallel about the cylinders and projecting radially therefrom, and means for rotating the cylinders in a plurality of steps cor-

responding with the positions of the pins thereon.

15. A plurality of sets of punches disposed in a straight line transverse to said punches, a reciprocatory member, a shaft with its axis parallel with said straight line carried by said member, a plurality of cylinders affixed to said shaft, one of the cylinders being over each set of punches, a plurality of pins on each cylinder corresponding in number with the number of punches in their respective set, said pins being spaced spirally about the cylinders and projecting radially therefrom, and automatic means actuated by the reciprocation of said member for rotating the shaft at desired intervals in a plurality of steps corresponding with the positions of the pins on the cylinders.

16. A plurality of rows of punches, a plurality of pins over the punches about axes parallel with said rows, means for imparting continuous relative movement to said punches and pins, and means for changing the positions of said pins after a given number of said relative movements.

17. A plurality of rows of punches, a plurality of sets of pins over the punches about axes parallel with said rows, means for imparting a relative movement to said punches and pins, and means for changing the positions of the sets of pins consecutively at desired intervals.

18. A plurality of rows of punches disposed on parallel straight lines, a reciprocatory member, a plurality of sets of pins carried thereby, each set being spaced about an axis above one of said lines, said pins being arranged to actuate any desired one or more of the punches, means automatically actuated by the movement of the reciprocatory member for changing the positions of the pins in one set at desired intervals in a number of steps corresponding with the number of pins in said set, and to change the positions of the pins in the other sets at other intervals proportional to the intervals of change of the first set.

19. A plurality of rows of punches disposed on parallel straight lines, a reciprocatory member, a plurality of sets of pins carried thereby, each set being spaced about an axis above one of said lines, said pins being arranged to actuate any desired one or more of the punches, selective mechanism actuated by the movement of the reciprocatory member for consecutively changing the positions of all of the pins in one set at desired intervals, and to shift the positions of the pins in the next set one step after all of the pins in said first set have been brought into their operative positions.

20. A plurality of rows of punches disposed on parallel straight lines transverse to said punches, a reciprocatory member, cylinders carried by said reciprocatory mem-



ber, one of said cylinders being above each of said rows of punches, a plurality of pins spaced about said cylinder and projecting radially therefrom, said pins being arranged to actuate any desired one or more of the punches, a selective ratchet-and-pawl mechanism actuated by the movement of the reciprocatory member for consecutively rotating said cylinders, said mechanism being arranged to move one of said cylinders a desired number of steps and to then move the next consecutive cylinder one step, said steps being proportional to the number of pins on the various cylinders.

21. A plurality of rows of punches disposed on parallel straight lines, a reciprocatory member, a plurality of engaging devices carried thereby, said engaging devices being arranged to actuate any desired one or more of the punches during each reciprocation of said member, automatic means for

changing the positions of some of said devices after a given number of movements of the reciprocatory member, and manually set means for changing the positions of others of the engaging devices.

22. A plurality of punches set on a transverse straight line, a reciprocatory member parallel with said line arranged to actuate any desired one or more of said punches, and automatic means for moving said member after a given number of said reciprocations into a different operative position to cause it to actuate others of the punches.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES O. PEARSON

Witnesses:

ELLA TUCH,

J. R. MILLWARD.