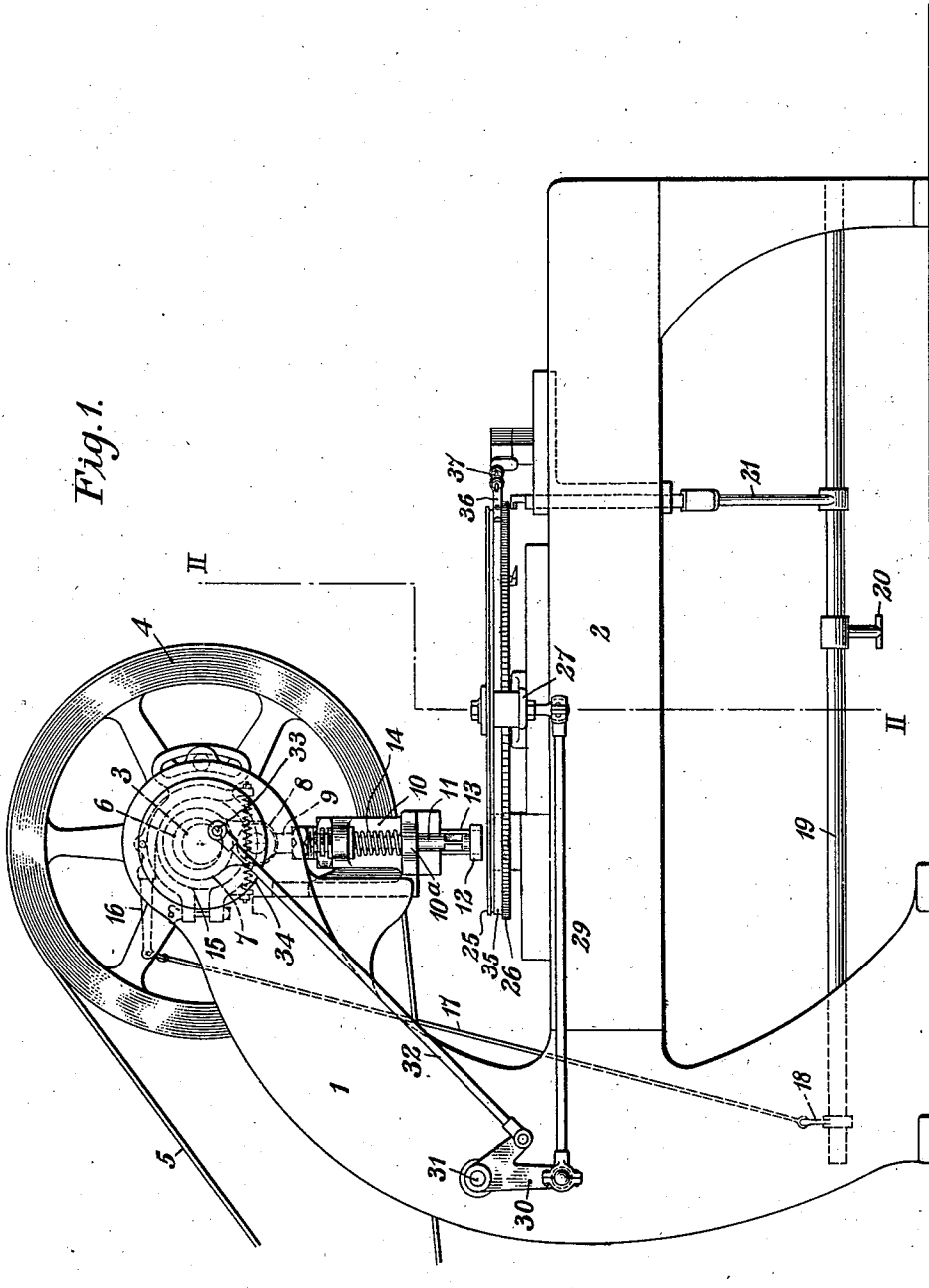


3 SHEETS--SHEET 1.

Fig. 1.



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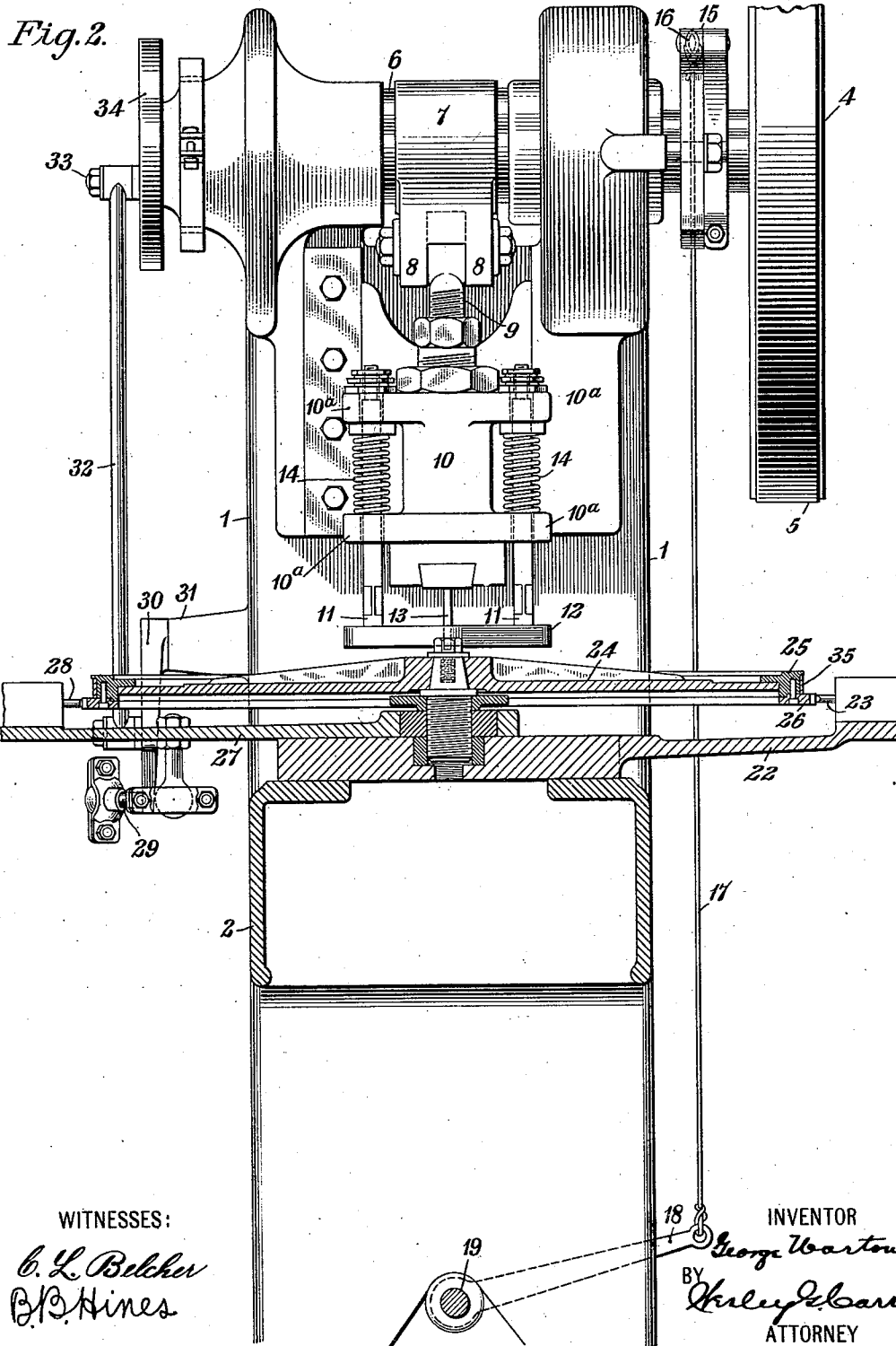
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G. WORTON.
 AUTOMATIC FEEDING MECHANISM FOR MACHINE TOOLS.
 APPLICATION FILED JAN. 30, 1909.

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Patented Mar. 8, 1910.

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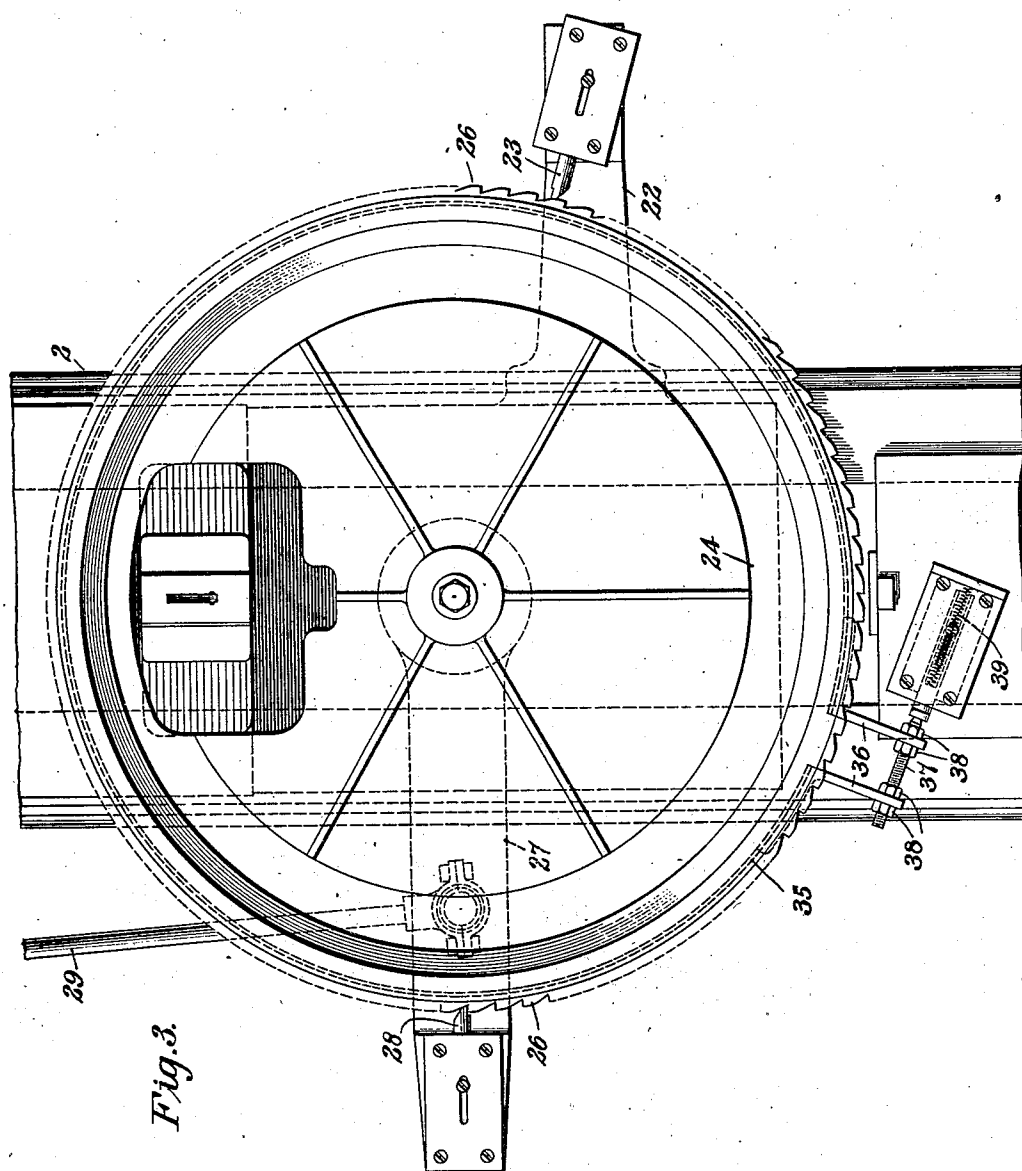


Fig. 3.

WITNESSES:

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AUTOMATIC FEEDING MECHANISM FOR MACHINE-TOOLS.

951,169.

Specification of Letters Patent.

Patented Mar. 8, 1910.

Application filed January 30, 1909. Serial No. 475,226.

To all whom it may concern:

Be it known that I, GEORGE WORTON, a subject of the King of Great Britain, and a resident of Manchester, in the county of Lancaster, England, have invented a new and useful Improvement in Automatic Feeding Mechanism for Machine-Tools, of which the following is a specification.

My invention relates to feeding mechanism for machine tools and it has for its object to provide a means whereby material fed to or through a cutting or marking machine shall be so guided and controlled that the successive cuts or marks made by the cutting or marking instrument shall be spaced apart with absolute accuracy, whatever may be the speed at which the machine is operated.

My invention is primarily designed for use in connection with punching machines employed for punching slots or notches in steel plates used in the manufacture of electrical machines, but it is adapted for more general application and use, it being suitable, either with or without slight modifications, in connection with machines employed for cutting or marking other materials in order to produce either toothed bars or rings, scales, dial plates, etc., and, in fact, any devices which are provided with a considerable number of uniformly spaced cuts, notches or markings, whether disposed in an annular series or otherwise.

My invention will be specifically described as applied to a punching press for which it was primarily and specially designed, with the understanding that it may be applied to other machines, to which it may be adapted, for the purpose of doing any kind of work which requires intermittent or step by step operation.

In the accompanying drawings, Figure 1 is a side elevation of a punching press equipped with my invention. Fig. 2 is a view, partially in front elevation and partially in section, the section being on line II—II of Fig. 1. Fig. 3 is a plan view of that portion of the punching press shown in Figs. 1 and 2 which pertains specifically to my invention.

The main portions of the punching press shown in the drawings are of standard construction and I shall, therefore, give only such description of them as is necessary to enable the structure and mode of operation

of my improvements to be clearly understood.

Journalled in the arms 1 of the frame 2 of the press is a shaft 3 on one end of which is mounted a driving wheel or pulley 4, which is connected to a line shaft pulley or driving motor by means of a belt 5. The middle portion of the shaft 3 is provided with an eccentric 6, which is surrounded by a collar 7 having ears 8 at one side. The upper end of a rod 9 is pivotally connected to the ears 8 and its lower end is adjustably attached to a cross-head 10. Projecting through holes in the laterally projecting portions 10^a of the cross-head, are rods 11, the lower ends of which are connected by a bar 12. Through the middle portion of the bar 12 operates a cutting tool 13 with which the lower end of the cross-head 10 is provided. The relation between the cross-head and the parts 11 and 12, which is shown in Figs. 1 and 2 of the drawings, is maintained by springs 14 until the said parts are carried downward, and then the bar 12 is arrested by the plate to be punched, and the springs 14 yield to permit the tool to do its work.

The starting and stopping of the press are effected by means of a clutch device 15, which is controlled through an arm 16, link 17, a lever arm 18, a shaft 19 and a treadle 20, at the will of the attendant, or by the parts just described (except the treadle 20) and a rod 21, the upper end of which is engaged by a portion of the feeding mechanism when it is desired to stop the operation of the press automatically, upon completion of a cycle of operations.

The parts thus far described pertain to standard machines and have been illustrated and described merely for the purpose of setting forth the relations in which my improvement is used.

Projecting laterally from one side of the frame of the press is an arm 22, on the outer end of which is mounted a spring-actuated holding pawl 23.

Journalled upon the horizontal portion of the frame 2 is an annular work holding member 24, comprising a brake wheel and a ratchet wheel 26, the teeth of the ratchet wheel being in position to be successively engaged by the holding pawl 23 and of such dimensions as may accord with the spacing of the cuts to be made by the

punching tool 13 in the sheet steel carried by the work holder.

Mounted concentrically with the work holder 24 is an arm 27, which projects laterally beyond the periphery of the work holder and is provided, at its outer end, with a spring-pressed pawl 28 in position to engage the teeth of the ratchet wheel 26. One end of a rod 29 is connected to the arm 27, the other end of the said rod being connected to one arm of a bell crank lever 30, which is pivotally supported on the frame of the machine at 31. The other arm of the bell crank lever 30 is connected, by means of rod 32, to a wrist pin 33, with which a wheel 34, mounted on one end of the shaft 3, is provided.

The brake wheel 25 is surrounded by a brake band 35, preferably of steel, provided with a leather lining, but made of other materials if desired. The adjacent ends 36 of the brake band 35 are connected together by means of a screw threaded rod 37, and are so adjusted with reference to each other as to make a fairly close fit between the band and the wheel, but so as to permit movement of the wheel under action of the parts 27, 28, 29, 30, 32, 33 and 34, the said ends 36 being held in their adjusted positions by means of nuts 38. The rod 37 is pressed outward against the action of the pawl 28 and its operating mechanism by means of a coil-spring 39, and the grip of the brake band upon the brake wheel is sufficient to insure a slight backward movement of the work holder, under the action of the spring 39, when the holder is released by a backward movement of the pawl 28.

The various parts of the machine are so timed in operation that, as the punching die is raised, after making a cut in the steel plate, the pawl 28, actuated by the link and lever mechanism, above described, carries the work holder forward slightly more than the distance represented by the length of a tooth, so that the holding pawl 23 is separated a slight distance from the holding end of the corresponding tooth of the ratchet wheel. The operating mechanism for the arm 27 at this instant draws the arm, and consequently the pawl 28, backward, and the spring 39, acting through the brake band upon the brake wheel, moves the work holder backward sufficiently to seat the pawl 23 against the holding end of the corresponding ratchet tooth and, at this instant, the punching die descends and cuts another slot or notch in the steel plate. The operation just described is repeated until the entire series of slots or notches have been punched, the press then being automatically stopped, a new plate inserted and the automatic punching operation repeated.

My invention not only insures accuracy of operation throughout a long and substan-

tially indefinite period of service because material wear of the parts is eliminated, but it permits of a speed of operation not heretofore attained or even approximated.

A machine equipped with my invention may be operated at the maximum speed at which the punching die will do its work properly without impairing the spacing function which the invention is designed to perform.

It will be readily understood that the speed and accuracy which are attained in the operation of the machine herein described may also be secured in connection with machines employed for making spaced cuts or marks in or upon other materials and for other purposes than those herein specifically set forth, and I desire it to be also understood that variations in structural details, either with or without minor changes in operation, may be made if found necessary or desirable, provided the operation is such as to insure a positive and accurate stop for the laterally movable member at the end of each movement step, whatever may be the direction or extent of which the positive action is effected.

I claim as my invention:

1. In a machine tool, the combination with a work holder, of means for arresting backward movements thereof at definite points, means for moving said work holder forward in successive steps slightly beyond said arresting points and means for returning the same to said arresting points.

2. The combination with an intermittently actuated work holder, of means for arresting backward movement thereof at definite points, means for moving said work holder forward in successive steps slightly beyond said arresting points and means for returning the same to said arresting points.

3. The combination with a work holder provided with a series of ratchet teeth, an actuating pawl to engage said teeth, means for moving said actuating pawl a distance slightly in excess of the length of a tooth, a holding pawl and means for automatically moving the work holder in a reverse direction to seat the holding pawl when the operating pawl is retracted.

4. The combination with a work holder provided with a series of ratchet teeth, a reciprocating operating pawl serving to successively engage said teeth and move the holder a distance slightly in excess of the length of a single tooth, a holding pawl, a brake band for the work holder and a spring cooperating with the brake band to seat the holding pawl when the actuating pawl is retracted.

5. The combination with a rotatable work holder comprising a band wheel and a ratchet wheel, of an actuating pawl, and means for moving the same a distance

slightly in excess of the length of a tooth, a holding pawl, a brake band and means co-operating with the brake band for seating the holding pawl when the actuating pawl
5 is retracted.

6. The combination with a reciprocating tool, of a work holder rotatable in a plane at right angles to the direction of operation of said tool, means for moving the work holder
10 forward step-by-step, a holding device and means for moving the work holder rear-

wardly to seat the holding device just prior to each forward movement of the reciprocating tool.

In testimony whereof, I have hereunto 15
subscribed my name this seventh day of January, 1909.

GEORGE WORTON.

Witnesses:

G. W. PINNER,
J. S. PECK.