(No Model.)

F. D. SWANEY.

GANG PUNCH.

No. 530,560. Patented Dec. 11, 1894.

Fig. 1.

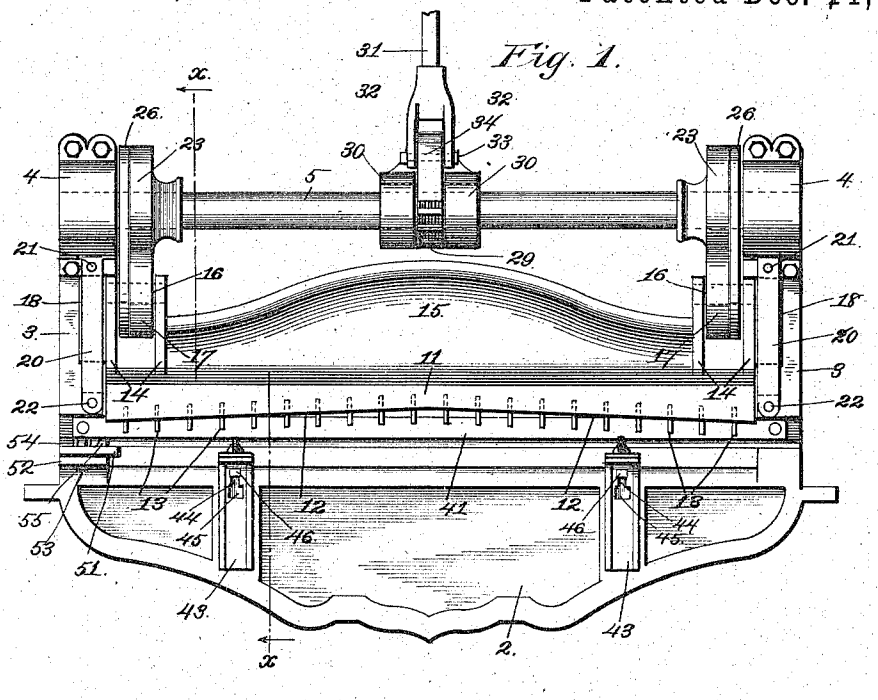

Fig. 2.

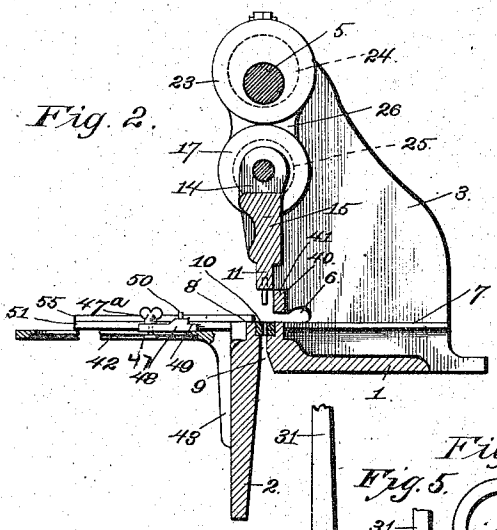

Fig. 3.

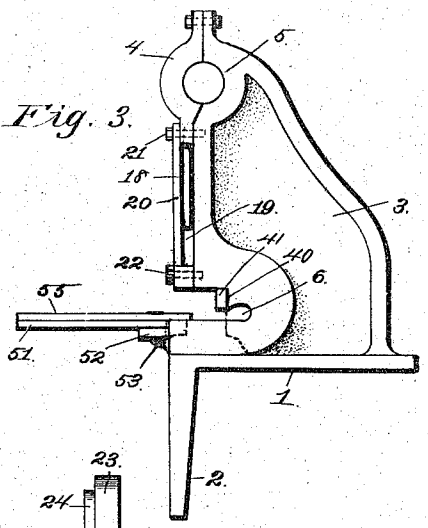

Fig. 4.

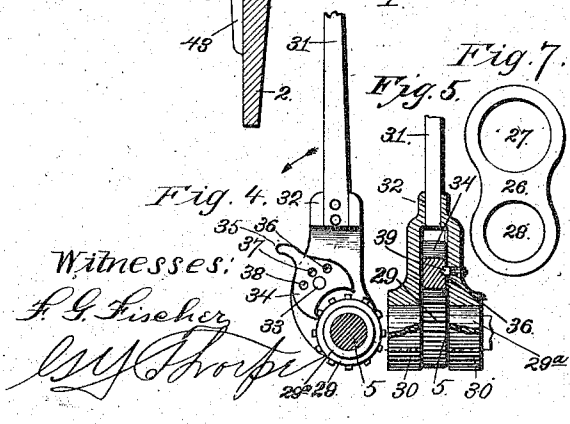

Fig. 5.

Fig. 7.

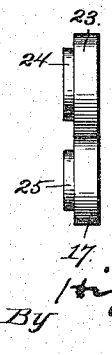

Fig. 6.

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UNITED STATES PATENT OFFICE.

FLETCHER D. SWANEY, OF KANSAS CITY, KANSAS.

GANG-PUNCH.

SPECIFICATION forming part of Letters Patent No. 530,560, dated December 11, 1894.

Application filed May 3, 1894. Serial No. 509,894. (No model.)

To all whom it may concern:

Be it known that I, FLETCHER D. SWANEY, of Kansas City, Wyandotte county, Kansas, have invented certain new and useful Improvements in Gang-Punches, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to gang-punches, and has for its primary object to produce a power mechanism for actuating the punch which is positive and reliable in operation; which is adjustable so as to give the operator the desired purchase, and so that the punch may be elevated without completing the down-stroke, if necessary or desirable; and furthermore, to produce a gang-punch having the punches arranged so that they shall not all engage the material simultaneously; and finally, to produce a punch which is simple, strong, durable and inexpensive of construction.

With these objects in view, the invention consists in certain peculiar and novel features of construction and combinations of parts, as hereinafter described and claimed.

In order that the invention may be fully understood, reference is to be had to the accompanying drawings, in which—

Figure 1. represents a front view of a gang-punch embodying my invention. Fig. 2. is a vertical section taken on the line *x*—*x* of Fig. 1. Fig. 3. is an end view of the same. Fig. 4. is a view showing the connection between the ratchet-wheel mounted upon the shaft, and the actuating or power lever. Fig. 5. is a vertical sectional view showing the spring-actuated pin engaging the pawl carried by said lever. Fig. 6. is a detail view showing one set of engaging eccentric and anti-friction rollers, and Fig. 7. is a detail view of the link which connects the same.

In the said drawings, the frame of the gang-punch comprises the horizontal base portion 1, and the flange 2, depending vertically from the front margin of the portion 1, and the portion 3, projecting vertically upward from each end of the base portion 1, which base portion, in operative position, will be bolted upon a work-bench or stand, and with its depending portion 2 fitting against the front side of the same. The front sides of the projections or standards 3 are provided with longitudinally aligned recesses near their upper ends, and in conjunction with bearing caps 4, bolted rigidly to said standards, form bearings for the horizontal shaft 5. The standards 3 are recessed at opposite points in their front margins at 6, so as to form a surface occupying the same horizontal plane as the upper surface of the supporting flanges or ribs 7, projecting inwardly from said standards 3; and the base portion 1, at its junction with the depending flange 2, is formed with a longitudinal rib 8, which connects the standards, and has its upper surface occupying the same horizontal plane as the upper surface of said supporting flanges or ribs 7, so as to form, in conjunction with said standards, and said ribs, a solid and substantial support for the metal to be punched, and this longitudinal rib 8, from its point of connection at one end with one standard 3, to its point of connection with the opposite standard 3, is longitudinally and centrally slotted as shown at 9, and mounted in recesses at suitable intervals in said rib, are the dies 10, the vertical apertures of which register with the slot 9. A punch-bar 11 is arranged parallel with and vertically above the slot 9 and the dies 10, and the under side of this punch-bar is beveled so as to form the inclined surfaces 12, 12, extending divergently downward from the middle of said punch-bar, and depending vertically from and to equal distances below the beveled under surfaces of said punch bar, are the punches 13; these punches being arranged vertically above their corresponding dies 10. It will be apparent by this arrangement that the dies will operate in pairs and successively upon the material to be punched, so that little power in practice will be required to operate the punch, and that the number of punches operating upon the material simultaneously, and their arrangement, may be varied as required, accordingly as the material is easy or hard to puncture.

Projecting vertically upward from each end of the bunch-bar, are a pair of ears 14, and connecting the inner or adjacent ears of each pair is a bracing or strengthening web 15, which also projects vertically up from and forms a part of the punch-bar 11, and rigidly mounted in and connecting each pair of ears 14 near their upper end, is a shaft 16, upon

which is loosely mounted the anti-friction roller 17, and projecting outwardly from each ear 14 at the extreme ends of the punch-bar, is a flange 18, which flanges engage and are adapted to operate vertically in the vertical slots 19, formed between the front side of the standards 3 and the vertical plates 20, which are bolted at their upper ends at 21, to the caps 4 and the standards 3, and at their lower ends at 22, to the standards 3.

Rigidly mounted upon the shaft 5, and vertically above and frictionally engaging the anti-friction rollers 17, are the eccentrics 23, and projecting outwardly from the outer faces of the eccentrics 23, are the annular shoulders 24, which are concentric to the periphery of the eccentrics 23; and projecting outwardly from the outer faces of the anti-friction rollers 17, are the annular shoulders 25, which are concentric to the shafts 16, and engaging said annular shoulders 24 and 25, are the circular openings 27 and 28, respectively, of the link-plates 26; said link-plates being interposed snugly between the eccentrics and rollers and the standards 3 and the ears 14, projecting from the ends of the punch-bar so as to be incapable of lateral displacement.

Keyed rigidly and centrally upon the shaft 5, is a ratchet-wheel 29, and said ratchet-wheel is provided at each side with the hub-flanges 29^a. A lever comprises the sleeves 30, which fit loosely upon the hub-flanges at each side of said ratchet, and are provided with the extensions or arms 32, which are bolted together and to the interposed lower end of the handle-portion 31 of the lever at their upper ends, and pivotally mounted upon a bolt 33, connecting said extensions or arms 32, is the double gravity-pawl 34; said pawl being provided, preferably, with the handle-portion 35, and this pawl is provided upon one face, and arranged concentric to the axis of said pawl, with the conical recesses 36, 37 and 38, one of which is always engaged by the conical or beveled end of the spring-actuated pin 39, carried by the extension or arm of one of said sleeves.

When it is desired to operate the lever forwardly or toward the front of the machine in the punching operation, the gravity-pawl occupies the position shown in Figs. 4 and 5; the spring-actuated pin 39 engaging the recess 36, and holding the front end of said pawl in engagement with the ratchet-wheel, so that with the operation of the lever the ratchet will be turned in the corresponding direction.

In order to prevent the punctured material from rising as the punches are withdrawn or moved upward, a longitudinal retainer-bar 41, is bolted or otherwise rigidly secured at its opposite ends in recesses formed above the recesses 6 in the standards 3, and with the lower side of said bar a suitable distance above the upper side of the rib 8 and the flanges 7, so as to allow the insertion to and the removal from position, of the material to be punched.

In order to punch the material upon any desired line parallel with its front or rear margin, gages are provided, which are constructed as follows: A pair of right-angled brackets, consisting of the horizontal arms 42 and the depending arms 43, is secured near the opposite ends of, and to the front side of, the depending flanges 2 of the machine; and the arms 43 of said brackets are provided with longitudinal slots 44, which terminate in enlargements 45 at their lower ends, and these brackets are supported upon the headed bolts 46 projecting outwardly from the flange 2; the neck of said bolts being engaged by the upper and narrow ends of the slots 44. Projecting vertically through longitudinal slots 47 in the arms 42, are bolts which also project through the gage-plates 48, and these gage-plates are held at any desired point of adjustment upon said arms by the clamping-nuts 47^a, which engage the projecting ends of said slots. The gage-plates 48 are recessed at their front ends at 49 to receive the outer margin of the plate to be punched, and projecting vertically from said gage-plates outward of said recesses, are the vertical pins 50, the object of which hereinafter appears.

In order to adjust the plate to be punctured so that the line of said punctures shall be at an angle to the front or rear margin of the plate, an end-gage 51 is provided, and said end-gage rests at its inner end upon the lug 52, projecting outwardly from one of the end-standards at its front side, and is clamped upon said lug and upon the bolt 53 by the nut 54, and extending longitudinally of said plate and projecting upwardly therefrom, is the rib 55, against which the end of the material to be punched is placed. It will be apparent from this construction, that by loosening the nut 54, the end gage-plate may be pivotally adjusted to the required position, and clamped in such position by the tightening of the nut.

In the operation of the machine, the plate to be punched is slipped through from the front or rear beneath the retaining bar 41 and the punch-bar 11, and is supported upon the rib 8. If introudced from the rear its length must not exceed the distance between the end-standards, so that it may rest also upon the supporting ribs 7. To adjust the plate so that the punctures shall be made in the required line, the gage-plates 48 are adjusted properly, and the front margin of the plate rests in the recesses 49. The lever is now operated in the direction of the arrow, Fig. 4, or toward the front, and the rotation of the ratchet-wheel causes, through the frictional action of the eccentrics upon the antifriction rollers 17, the punch-bar to be moved downward and puncture the plate, and it will be apparent by the arrangement of said punches that the full power exerted is only required to puncture the material in two places at the same time. It will be necessary, probably, to make two or more strokes of the

lever before the eccentric makes a half revolution, which is necessary to move the punch-bar down to its lowest point, and with each upward movement of the lever the pawl is grasped and operated so as to disengage the pin 39, from recess 36, and immediately the limit of said upward movement is reached said recess and said pin are re-engaged. The continued movement of the lever in a forward direction will complete the revolution of the eccentric, and will cause the same to elevate the punch-bar to its original position, as shown in Figs. 1 and 2, through the operation of the eccentric shoulders 24 in the openings 27 of the link-plates 26. It will thus be seen that the eccentrics operating directly upon the rollers 17, exert a constant and gradually increasing power to move the punch downward, and that said punches, after the puncturing operation is completed, are raised quickly by the eccentric shoulders operating in the openings of the link-plates. If desired, during the downward movement of the levers, to rearrange the material to be punched before completing said down-stroke, the pawl 34 is operated pivotally until the pin 39 engages the recess 38 and holds the opposite or rear end of the pawl into engagement with the ratchet-wheel. The continued operation of the lever will now on its up-stroke rotate the shaft in the opposite direction, and will cause the eccentric shoulders operating in openings of the link-plates which connect the shoulders of said eccentrics with the shoulders of the anti-friction rollers, to withdraw or elevate the punches without completing the down-stroke. After the plate is punctured near one margin, and it is necessary to puncture the same near the opposite margin, it is removed, and certain of the punctures made are fitted upon the pins projecting upwardly from the adjustable gage-plates, so as to hold the plate firmly in its new position. These pins are necessary, because the roughened surface at the lower margin of said punctures would not allow said plate to rest firmly to receive the succeeding or next action of the punches. The central recess 37, is engaged by the pin 39, when it is desired to hold the pawl out of engagement with the ratchet-wheel, as will be readily understood.

From the above description, it will be apparent that I have produced a gang-punch which is under the perfect control of the operator, which is positive and reliable in operation, and which is simple, strong, durable, and inexpensive of construction.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a gang-punch, the combination with a punch-bar, and anti-friction rollers carried thereby and provided with circular shoulders arranged concentric to the axis of said rollers, of a shaft, eccentrics mounted upon said shaft and frictionally engaging said anti-friction rollers, and provided with circular shoulders arranged concentric to the periphery of said eccentrics, and link-plates having openings engaging the circular shoulders of the anti-friction rollers and of the eccentrics, substantially as set forth.

2. In a gang-punch, the combination with a punch-bar having an oppositely inclined lower surface, and punches depending vertically from said lower surface, and anti-friction rollers carried by said punch-bar, and circular shoulders projecting from said anti-friction rollers and concentric to the axis thereof, of a shaft, eccentrics mounted upon said shaft and frictionally engaging said rollers, and eccentric shoulders, and link-plates having circular openings engaging the shoulders of said rollers and of the said eccentrics, substantially as set forth.

3. In a gang-punch, the combination with a punch-bar and anti-friction rollers carried thereby, of a shaft, eccentrics mounted upon said shaft and engaging said anti-friction rollers, a ratchet-wheel mounted upon said shaft, a lever, and a pawl carried by said lever and engaging said ratchet wheel, substantially as set forth.

4. In a gang-punch, the combination with a suitable framework, dies carried thereby, a punch-bar above said dies, anti-friction rollers carried thereby, and circular shoulders projecting from said anti-friction rollers, of a shaft journaled in said frame, eccentrics mounted upon said shaft and engaging said anti-friction roller, eccentric shoulders projecting from said eccentrics, and link-plates having openings connecting the circular shoulders of the rollers with the eccentric shoulders of the eccentrics, a ratchet-wheel mounted upon the shaft and provided with hub-flanges, a lever terminating in collars, which are mounted loosely upon said hub-flanges of the ratchet, a double pawl carried by said lever and provided with conical recesses, and a spring-actuated pin engaging one or the other of said recesses, substantially as set forth.

5. In a gang-punch, the combination with a suitable framework, provided with vertical guide-slots, and dies carried by said framework, of a reciprocatory punch-bar, having flanges engaging said guide-slots, anti-friction rollers carried by said punch-bar, a shaft, eccentrics mounted upon said shaft and engaging said anti-friction rollers, and link-plates having openings engaging the circular shoulders arranged concentric to the axis of said rollers, and circular shoulders arranged concentric with the periphery of said eccentrics, substantially as set forth.

6. In a gang-punch, the combination with a suitable framework provided with a longitudinally slotted rib, and dies carried by said rib, and supporting flanges arranged in the same horizontal plane as the upper surface of said rib, and brackets carried by said framework, of adjustable gage-plates carried by

said brackets, a gage-plate carried by said frame at one end, and means to adjust said gage-plate at an angle to the longitudinally-extending slot of the rib, substantially as set forth.

7. In a gang-punch, the combination with a suitable framework, and dies carried thereby, of brackets secured to the framework, and gage-plates carried thereby, and recessed at their inner ends, and pins projecting upward from said gage-plates, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

FLETCHER D. SWANEY.

Witnesses:
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M. R. REMLEY.