

No. 765,087.

PATENTED JULY 12, 1904.

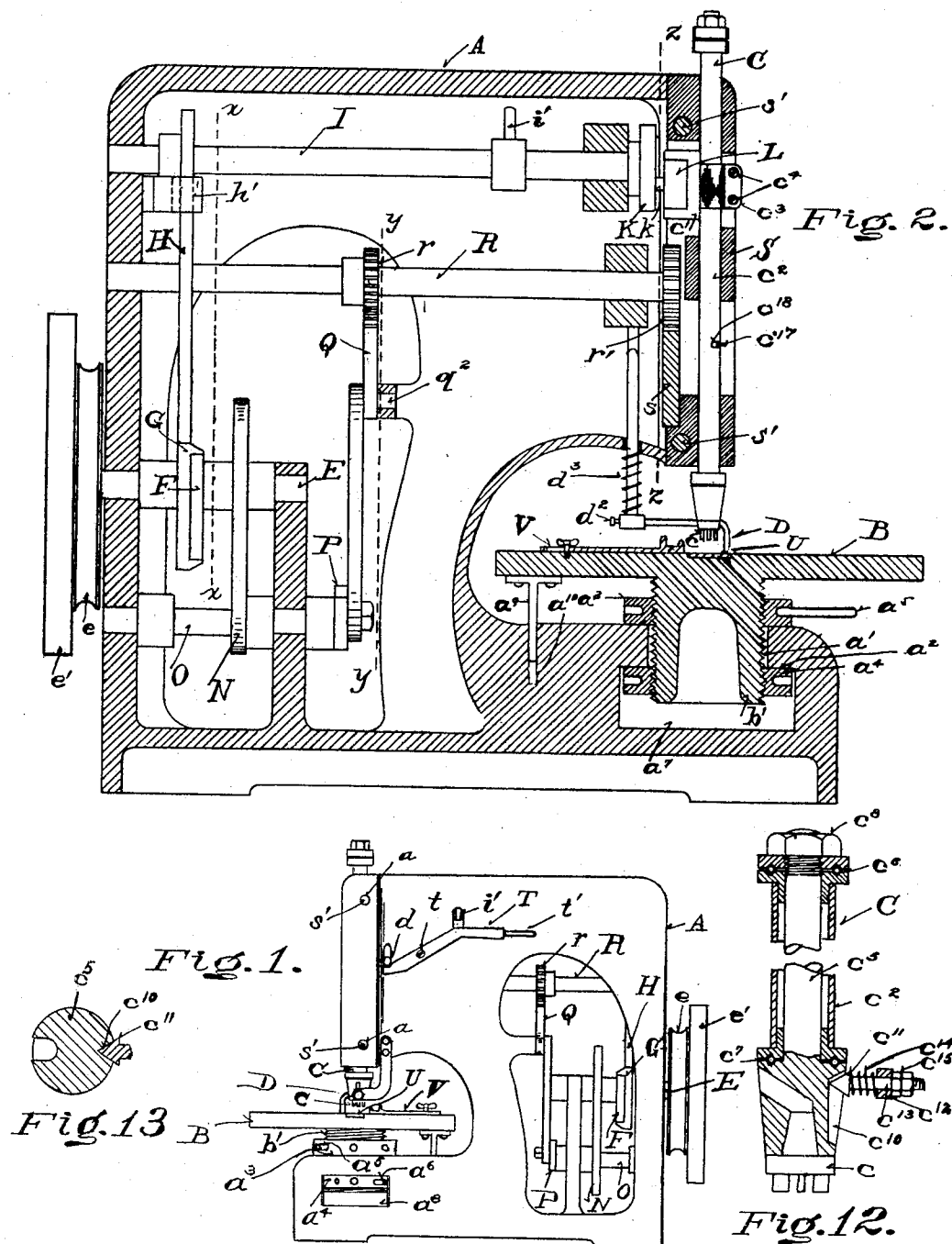
W. F. LAUTENSCHLAGER & E. B. HUME.

PUNCHING MACHINE.

APPLICATION FILED OCT. 19, 1903.

NO MODEL.

2 SHEETS--SHEET 1.



Witnesses.

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Henry W. Bauer
Herbert F. Harden

Inventors.

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Edgar B. Hume,
by A. F. Herbert New Money-

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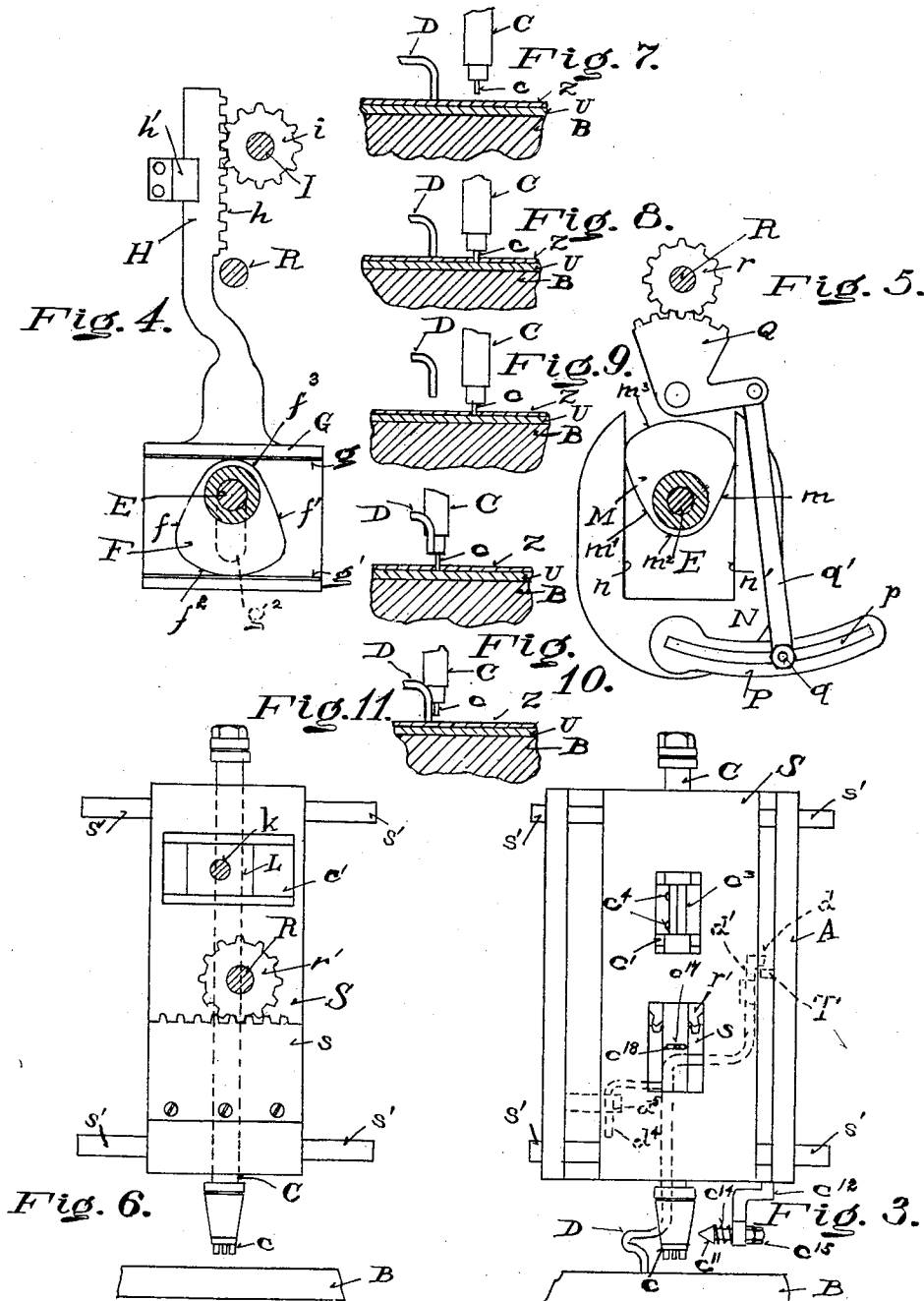
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by H. F. Walcott, their Attorney

UNITED STATES PATENT OFFICE.

WILLIAM F. LAUTENSCHLAGER AND EDGAR B. HUME, OF CINCINNATI,
OHIO.

PUNCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 765,087, dated July 12, 1904.

Application filed October 19, 1903. Serial No. 177,653. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM F. LAUTENSCHLAGER and EDGAR B. HUME, citizens of the United States, and residents of Cincinnati, in the county of Hamilton and State of Ohio, have jointly invented certain new and useful Improvements in Punching-Machines, of which the following is a specification.

Our invention relates to punching-machines especially adapted for providing the ornamental punching on boot or shoe uppers or the like, and has for its object the providing in a machine of this character of novel means whereby the punch acts as a feeding agency, and the invention will be readily understood from the following description and claims and from the drawings, in which—

Figure 1 is a side elevation of our improved device. Fig. 2 is a central longitudinal section of the same. Fig. 3 is a front elevation of the front end of the same, partly broken away. Fig. 4 is transverse section taken on the line $x-x$ of Fig. 2, showing the cam mechanism for reciprocating the punch for performing the punching operation. Fig. 5 is a transverse section taken on the line $y-y$ of Fig. 2, showing the cam mechanism for transversely feeding the punch. Fig. 6 is a transverse section on the line $z-z$ of Fig. 2, showing the means on the punch-head for imparting the various movements to the punch. Figs. 7 to 11, inclusive, are diagram views of the punch and pressure-foot, showing those parts in different relations assumed during operation. Fig. 12 is a central longitudinal section of the punch-ram, showing the connection between the punch-ram spindle and its casing. Fig. 13 is a detail in cross-section, showing the punch-spindle and its centering-stem.

A represents the frame of the machine, and B the table.

C is the punch-ram, to which a suitable punch c is secured, and D the pressure-foot.

E is a driving-shaft operated in suitable manner, as from a pulley e , having fly-wheel e' .

For operating the punch for punching the shaft E is provided with a cam F, engaging a reciprocating block G. The cam F has ec-

centric faces f, f' and concentric faces f^2, f^3 . 50
The block G has upper contact-face g and lower contact-face g' , arranged to be engaged by the faces of the cam F. For raising the block, and consequently depressing the punch, eccentric face f engages the face g and in the 55
revolution of the cam gradually raises the block to its limit of upward movement, when the concentric faces f^2, f^3 of the cam F contact with the faces g, g' , respectively, for main- 60
taining the block in its raised position for a given part of the rotation of the cam. The eccentric face f then engages the contact-face g' , the continuing revolution of the cam F de- 65
pressing the block and raising the punch, the concentric faces f^3, f^2 then contacting with the 65
faces g, g' , respectively, for maintaining the block in depressed position for another given part of the rotation of the cam. The faces of the cam and block are preferably so related as to have no lost motion between them. 70
Suitable gibbs may be provided on the block to take up wear from time to time.

The block G is provided with a slot g^2 , the side walls of which take against the shaft E for guiding the block vertically. A shank H 75
projects from the block G and has upon it a rack h , which engages a pinion i on a shaft I. A guide h' holds the rack in engagement with the pinion. The reciprocation of the block and rack rock the shaft I alternately in re- 80
verse directions. At its front end the shaft I carries a crank-wheel K, having a crank-pin k , which engages a slide L in a guide-block c' on the punch-ram C. The relation of the cam F, block G, rack h , and pinion i to the shaft 85
I and the relation of the crank-pin and guide to the punch is such that in the punching action the crank-pin will rock in the arc of a circle to a position vertically below the longitu- 90
dinal axis of the shaft I (when the crank-pin is at its lowest limit of movement) for performing the punching operation and will then continue its rocking motion in the arc of the circle to a point just above said lowest limit of movement, thereby relieving the punch suf- 95
ficiently from its plate to permit transverse travel of the punch while it is still retained in the material being punched. The punch be-

ing retained in the material during its transverse travel feeds that material the distance of said transverse travel, which transverse travel is effected by means we shall now describe.

5 For imparting transverse travel to the punch the shaft E carries a cam M, which engages the side contact-faces n n' of an oscillating block N, secured to and arranged to rock a shaft O, the cam being arranged so as to have

10 eccentric faces m m' for rocking the block N and concentric faces m^2 m^3 for maintaining the block N in a given position. The shaft O has an arm P secured thereto in a slot p , of which a stud q is adjustably secured. The stud has

15 articulated therewith a link q' , which is in turn articulated with a sector Q, engaging a pinion r on a shaft R. The sector is pivoted at q^2 to the frame. At its forward end the shaft R carries a pinion r' , meshing with a

20 rack s on the head S for the purpose of imparting transverse feed to the said head S and the punch. The head has guideways on the frame, shown in the form of bars s' , sliding in ways a on the frame. The punch-ram reciprocates in ways on the head. The stud q

25 can be adjusted to any point in the slot p for regulating the length of feeding stroke of the punch. When adjusted to a point coincident with the longitudinal axis of the shaft O, the

30 feed of the punch is neutral. The farther from this longitudinal axis that the stud q is set the longer will be the feeding stroke of the punch, as the shaft O in rocking rocks the arm P, the movement of the arm increasing as the

35 distance increases from the longitudinal axis of the shaft, thereby imparting increasing throw to the sector Q and increasing rocking motion to the shaft R and consequent increasing transverse motion to the head S through the pinion

40 r' and rack s .

For imparting the requisite raising and lowering action to the pressure-foot D the shaft I is provided with a finger i' , adapted to take against a lever T, pivoted at t to the frame,

45 the end of the lever taking under a lug d' of a stem d' , to which latter the pressure-foot is secured, as by a set-screw d^2 . A spring d^3 takes between the frame and pressure-foot for depressing the pressure-foot. A guide-

50 stem d^4 takes through a lug d^5 in the frame for preventing swiveling of the pressure-foot. The lever T has a handle t' , shown in the form of a flattened end, by which the lever may be depressed by the thumb or fingers for

55 raising the pressure-foot by hand.

The table B has a recess for receiving a plate U, of brass or similar substance, for receiving the thrust of the punch passing through the material. This plate is adjustable for pre-

60 senting different parts of its surface to the punch as the plate becomes worn at the point at which it has been used, or, if desired, the plate may be circular in form and adjusted about its axis. A gage V may also be provided on the table.

In operation the material (shown at Z) is placed on the table under the pressure-foot with the punch raised, the punch and pressure-foot being in the relative positions indicated in Fig. 7. When in this position, the eccentric face f' will be at the beginning of its contact with the face g preparatory to raising the block G and depressing the punch. The concentric faces m^2 m^3 will also be at the beginning of their contact with the side face n n' for permitting the cam M to rotate between the contact-faces n n' for causing the block N to remain stationary and the transverse feed of the punch-ram head S to be neutral. The pressure-foot D will also be pressed against the material for holding it in place preparatory to be punched. In the rotation of the driving-shaft E the eccentric face f' will next travel against the face g , causing a raising of the block G and consequent depressing of the punch-ram C through the medium of the shaft I and its connections. The depressing of the punch-ram C causes the punch c to enter the material, and when the crank-pin k is vertically below the shaft I—that is, in its lowest position—the punch will have pierced the material, the punch and pressure-foot being then in the relative position shown in Fig. 8. The parts are so correlated that at this point the shaft I will have rocked sufficiently to bring the finger i' above the lever T, and when the crank-pin k has slightly passed beyond its position vertically below the shaft I the finger i' will have depressed the lever T, thereby raising the pressure-foot D and releasing the material from pressure preparatory to feeding it by means of the punch. When the shaft I and its parts are in the correlation just explained, the crank-pin k will have slightly passed its position vertically below the longitudinal axis of the shaft I, and, describing the arc of a circle about that shaft, as it does, it will have raised the punch c sufficiently to relieve it of its final piercing action through the material while retaining the punch in the material—*i. e.*, the punch while remaining in the material will be relieved of its piercing action just sufficiently to allow it to have transverse movement on the table while still embedded in the material, the punch and pressure-foot being then in the relative position shown in Fig. 9. When the crank-pin k arrives at the position just explained, the turning of the shaft I ceases by reason of the concentric faces of the cam F having arrived in their rotation against the contact-faces of the head G, causing the shaft I and parts operated thereby to remain neutral. At the same time the eccentric face m will have arrived at the side contact-face n , thereby rocking the block N and shaft O, operating rack or sector Q and pinion r and rocking shaft R, and, through the pinion r' and rack s on the head S, causing transverse movement of the head and feeding action of the punch, the length of

stroke of its feeding action being dependent on the position of the lug q on the arm P, bringing the punch and pressure-foot relatively into the position indicated in Fig. 10. The eccentric face f will next impinge against the lower contact-face g' of block G, depressing the block G and reversely rocking the shaft I, thereby raising the finger i' and permitting the pressure-foot D to take firmly against the material for holding it in place preparatory to the raising of the punch, the punch being then raised out of the material. During this operation the concentric faces m^3 m^2 will have been traveling against the contact-faces n n' , thus neutralizing transverse movement of the punch, the punch and pressure-foot being in the correlation shown in Fig. 11. The concentric faces of the cam F will then again register with the contact-faces of the block G for neutralizing the raising and lowering of the punch and the eccentric face m make contact with the side face n' of the block N, thereby rocking the block N and arm P, and, through the shaft R, pinion r' , and rack s , causing reverse transverse movement of the head S, bringing the parts to the original position. (Shown in Fig. 7.) The crank-pin k enters the slide L, the slide L and guide-block c' having relatively sliding movement, the slide sliding in the guide-block when the punch is raised or lowered and the guide-block sliding on the slide when the head is traversed.

From the above description it will be noted that the punch is momentarily in its lowest position when finally piercing the material; that it is instantly raised to a position of relief from this extreme piercing relation when it is traversed while still embedded in the material, thus feeding the material; that the punch is then raised out of the material and traversed in its raised position to original position, thus traversing in opposite directions at different elevations, said elevations being above the lowermost positions of the punch.

Our improved construction of machine permits the machine to be used either as a right or left hand machine by the mere reversal of the direction of movement of the driving-shaft. When using the machine as a left-hand machine, a pressure-foot reversely bent to that shown in the drawings, so as to bring it in rear of the punch, may be employed. It also permits of a wide range in adjustment of distance between adjacent punch-holes.

The punch-ram may consist of a casing c^2 , to which the guideway-block c' is secured by having a strap c^3 on said block take about the casing and clamped thereto by bolt c^4 . The casing houses a punch-spindle c^5 , which may be termed a "punch-shank," having a slight rotative motion in the casing, ball-bearings c^6 c^7 being interposed between the spindle and casing, adjusting-nut c^8 being provided. The spindle has a V-shaped recess c^{10} in its side,

into which a correspondingly-shaped stem c^{11} is adapted to take. This stem is mounted on an arm c^{12} , secured to the frame, the stem sliding in an aperture c^{13} in the arm and having a spring c^{14} between the stem and arm to urge the stem outwardly, an adjusting-nut c^{15} being provided to limit the projection of the stem toward the spindle. The stem is so set that at the forward transverse movement of the punch-ram the walls of the recess c^{10} will engage the faces of the point of the stem and center the punch. This construction is especially useful when using a punch having a plurality of punching-prongs. It permits the punch to be turned while embedded in the material, so as to permit turning of the material in punching along small curves or short turns, so that the ornamentation made by the punch may always extend radially of the curve or turn, the turning of the material being done after the punch has started in its transverse movement away from the stem c^{11} , thereby being relieved from that stem. A slight turning of the punch is sufficient, and to limit the turning of the punch we provide the spindle with a pin c^{17} , engaging the walls of an aperture c^{18} in the casing, so that the recess c^{10} may not be accidentally turned beyond the point of engagement with the pointed stem c^{11} .

The table B has a threaded neck b' , taking into the throat a' of an inner flange a^2 of the frame, nuts a^3 a^4 screwing about the neck and clamping to top and bottom of the flange for vertically positioning the table with relation to the punch. The nut a^3 is provided with holes about its periphery for receiving a pin a^5 , and the nut a^4 has similar holes for receiving a pin a^6 . The lower nut a^4 is in a recess a^7 , having an opening a^8 communicating therewith from the outside of the frame, affording ready access to the lower nut and making exceptionally convenient, compact, and accurate adjustment of the table to vertical position with relation to the punch. A shank a^9 takes from the table into a socket a^{10} for preventing swiveling of the table.

Having thus fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a punching-machine, the combination with the frame, punch-ram head, and a punch-ram on the latter, of a punch-ram shaft, a punch-ram-head shaft, an eccentric connection between said punch-ram shaft and punch-ram for moving the punch-ram up and down, means between said punch-ram-head shaft and head for transversely reciprocating the head, and a pair of eccentrics and connections between the same and said respective shafts for rocking said shafts.

2. In a punching-machine, the combination of a frame, a punch-ram head, a punch-ram for the latter, a punch-ram shaft, a connection between said shaft and punch-ram for moving the punch-ram up and down, a driving-shaft hav-

ing an eccentric, and a rack and pinion between said eccentric and punch-ram shaft operating to reciprocate said rack and rock said latter shaft, substantially as described.

5 3. In a punching-machine, the combination of a frame, a punch-ram head, a punch-ram for the latter, a punch-ram shaft, a connection between said shaft and punch-ram for moving the
10 punch-ram up and down, a driving-shaft having an eccentric, a rack and pinion between said eccentric and punch-ram shaft operating to reciprocate said rack and rock said latter shaft, a pressure-foot, a lever for raising the same and a finger on said punch-ram shaft operating
15 said lever, substantially as described.

4. In a punching-machine, the combination of a frame, a punch-ram head, a punch-ram for the latter, a punch-ram shaft, a connection between said shaft and punch-ram for moving the
20 punch-ram up and down, a driving-shaft having an eccentric, a rack and pinion between said eccentric and punch-ram shaft operating to reciprocate said rack and rock said latter shaft, and means for laterally reciprocating said
25 head, substantially as described.

5. In a punching-machine, the combination of a frame, a punch-ram head, a punch-ram therefor, a shaft having an eccentric thereon, a second shaft, and connection between said
30 second shaft and eccentric for rocking said second shaft, an eccentric connection between said second shaft and the punch-ram, a punch-ram-head shaft, a rack and pinion between said latter shaft and said first-named shaft for rocking
35 said punch-ram-head shaft, and rack-and-pinion connection between said latter shaft and the punch-ram head for transversely reciprocating said head, substantially as described.

40 6. In a punching-machine, the combination of the frame, punch-ram, head for the latter, a punch-ram-head shaft, a connection between said shaft and head for transversely reciprocating said head, a rock-shaft, and a rack and
45 pinion between said rock-shaft and punch-ram-head shaft for rocking said head-shaft, substantially as described.

7. In a punching-machine, the combination of the frame, punch-ram, and head for the latter, a punch-ram-head shaft, a connection between
50 said shaft and head for transversely reciprocating said head, a rock-shaft, an arm rocking therewith, and an adjustable connection between said arm and said punch-ram-head shaft for rocking the latter.
55

8. In a punching-machine, the combination of a frame, a punch-ram head, a punch-ram for the latter, a punch-ram shaft, a connection between said shaft and punch-ram for moving
60 the punch-ram up and down a driving-shaft having an eccentric and a rack and pinion between said eccentric and punch-ram shaft operating to reciprocate said rack and rock the said latter shaft, a punch-ram-head shaft, a
65 connection between said shaft and head for

transversely reciprocating said head, a rock-shaft, an arm rocking therewith, and an adjustable connection between said arm and punch-ram-head shaft for rocking the latter, substantially as described. 70

9. In a punching-machine, the combination with the frame, of a transversely-reciprocating head thereon, a vertically-reciprocating punch-ram on the head, a punch-ram shaft, a shaft for said head, connections between said
75 punch-ram shaft and punch-ram for reciprocating the latter, connections between said head-shaft and head for reciprocating the latter, and a pair of eccentrics with connections between said eccentrics and said punch-ram
80 shaft and head-shaft respectively for rocking said last-named shafts, substantially as described.

10. In a punching-machine, the combination with the frame, of a transversely-reciprocating
85 punch-ram head thereon, a vertically-reciprocating punch-ram on the said head, a punch-ram shaft, a shaft for the head, connections between said punch-ram shaft and punch-ram for reciprocating the latter, connections between
90 said head-shaft and head for reciprocating the latter, a driving-shaft having a pair of eccentrics, a pair of racks reciprocated by said eccentrics, a pinion engaging one of said racks for operating the punch-ram shaft and
95 a second pinion engaging the other of said racks for operating the head-shaft, substantially as described.

11. In a punching-machine, the combination of the frame, punch-ram head and punch-ram, a punch-ram shaft, a punch-ram-head shaft, a rack, a pinion on the punch-ram shaft engaged by said rack, a rock-shaft, an arm thereon, a sector, a link having adjustable connection with said arm and connecting with said
105 sector, a pinion engaged by said sector and connection between the said pinion and head-shaft, a driving-shaft having a pair of eccentrics, blocks therefor, and connections between said blocks and said rack and rock-shaft, respectively, substantially as described. 110

12. In a punching-machine, the combination with the frame, transversely-reciprocating head and punch-ram reciprocating up and down, means for reciprocating said head transversely, a punch-ram shaft, a crank-wheel
115 thereon having a crank-pin, a slide engaged by said pin and a slideway on said punch-ram for said slide, constructed and operating substantially as described. 120

13. In a punching-machine, the combination with the frame, punch-ram and punch-ram head, of a punch-ram shaft, a punch-ram-head shaft, connections between said shafts and the punch-ram and punch-ram head respectively,
125 a driving-shaft, a connection between said driving-shaft and punch-ram shaft, and adjustable connection between said driving-shaft and punch-ram-head shaft.

14. In a punch-feeding punching-machine, 130

the combination with the frame, transversely-reciprocating head and punch-ram reciprocating up and down, means for reciprocating the head transversely, a punch-ram shaft, a slide forming a driving-block for the punch-ram, a driving connection between said block and said last-named shaft, said punch-ram having guideway for the block, said slide and guideway alternately sliding upon each other, and constructed and operating substantially as described.

15. In a punch-feeding punching-machine the combination with the frame, punch-ram head, and punch-ram, of a pair of rock-shafts and connections therefrom to said punch-ram head and punch-ram respectively for alternately reciprocating the punch-ram head and punch-ram respectively, and means for rocking said shafts.

16. In a punch-feeding punching-machine, the combination with the frame, punch-ram head and punch-ram, of a pair of rock-shafts, means alternately operating said rock-shafts, connection between one of said rock-shafts and said punch-ram and connection between the other of said rock-shafts and the punch-ram head for raising, depressing and traversing said punch-ram.

17. In a punch-feeding punching-machine, the combination with the frame, transversely-reciprocating head and punch-ram reciprocating up and down, of a slide forming a driving-block for the punch-ram, said punch-ram having a guideway for the slide, a rock-shaft, an eccentric driving connection between said rock-shaft and the slide, and means for reciprocating said head transversely, substantially as described.

18. In combination, in a punching-machine, a punch-ram comprising in combination a casing and a punch-spindle journaled therein, and a stem, said stem and spindle collectively having converging contact-faces alternately relieving and contacting automatically for centering the punch, substantially as described.

19. In a punch-feeding punching-machine,

the combination with the frame and the vertically-reciprocating and transversely-moving punch-ram, of a table having a threaded neck, said frame having an inner flange and a throat for receiving said neck, and a nut at top and a nut at bottom of said flange on said neck for positioning and clamping said table in desired elevation with relation to said frame and punch-ram, substantially as described.

20. In a punching-machine, the combination of a punch-ram, a punch-shank, and means automatically alternately disconnecting and connecting said punch-shank for permitting rotation and causing centering of the punch.

21. In a punching-machine, the combination of a punch-ram, a punch-spindle journaled thereon, ball-bearings between said spindle and ram and constructed for permitting turning of said spindle on said ram during operation, and means for automatically centering the punch.

22. In a punch-feeding punching-machine, the combination of a punch-ram, a punch-shank, means between said punch-shank and punch-ram permitting said shank to turn on the ram during operation and means automatically centering the punch-shank during operation.

23. In a punch-feeding punching-machine, the combination with the frame, of a laterally-moving and vertically-reciprocating punch-ram, a punch-shank journaled and capable of being rocked thereon during operation, and centering means for the punch-shank between said shank and frame automatically positioning said shank for each stroke of the punch-ram.

In witness whereof we have signed our names hereto in the presence of two subscribing witnesses.

WILLIAM F. LAUTENSCHLAGER.
EDGAR B. HUME.

Witnesses:

HERBERT F. HARDEN,
HENRY N. BAUER.