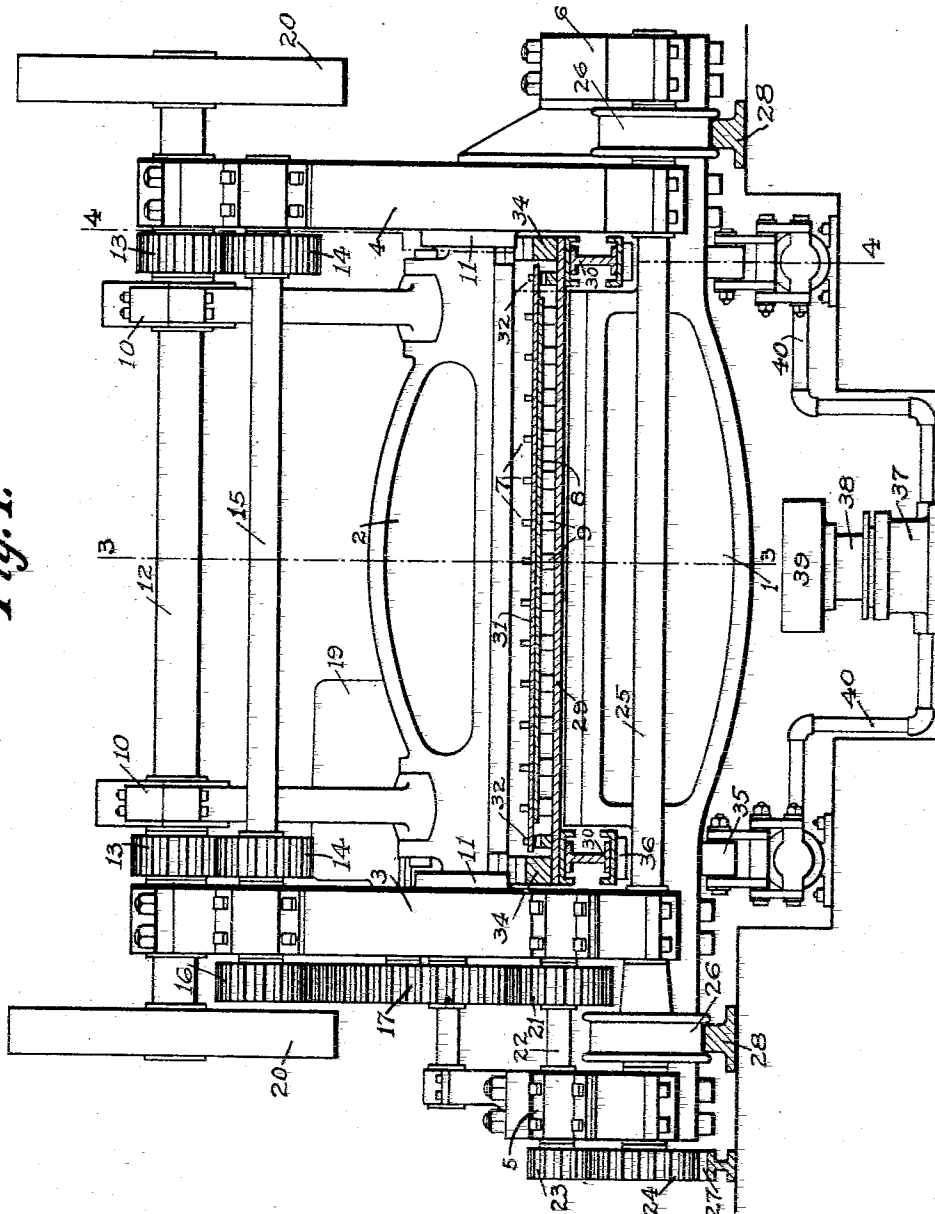


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APPLICATION FILED-MAR. 1, 1907.

939,185.

Patented Nov. 2, 1909.
4 SHEETS-SHEET 1.

Fig. 1.



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Fig. 3.

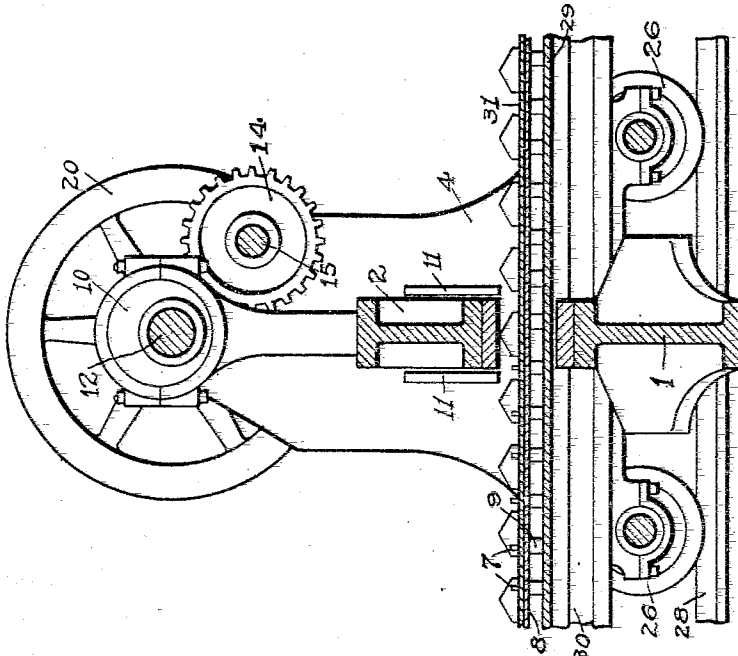
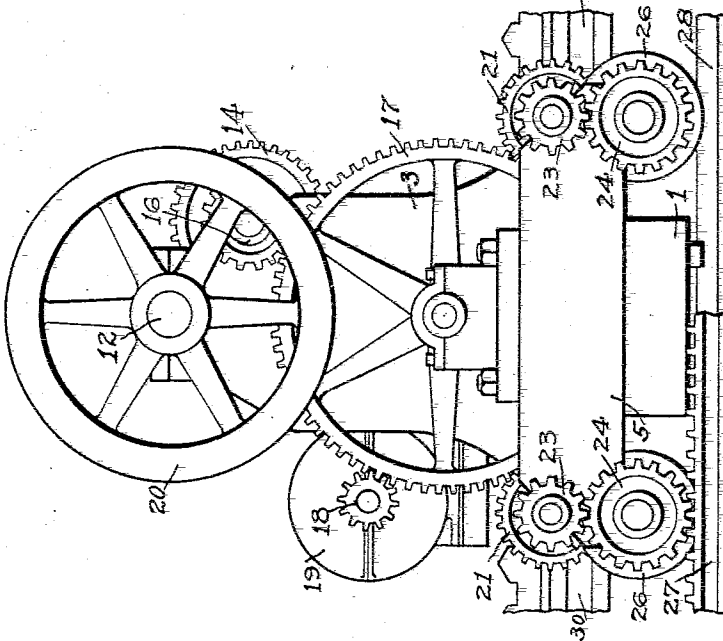


Fig. 2.



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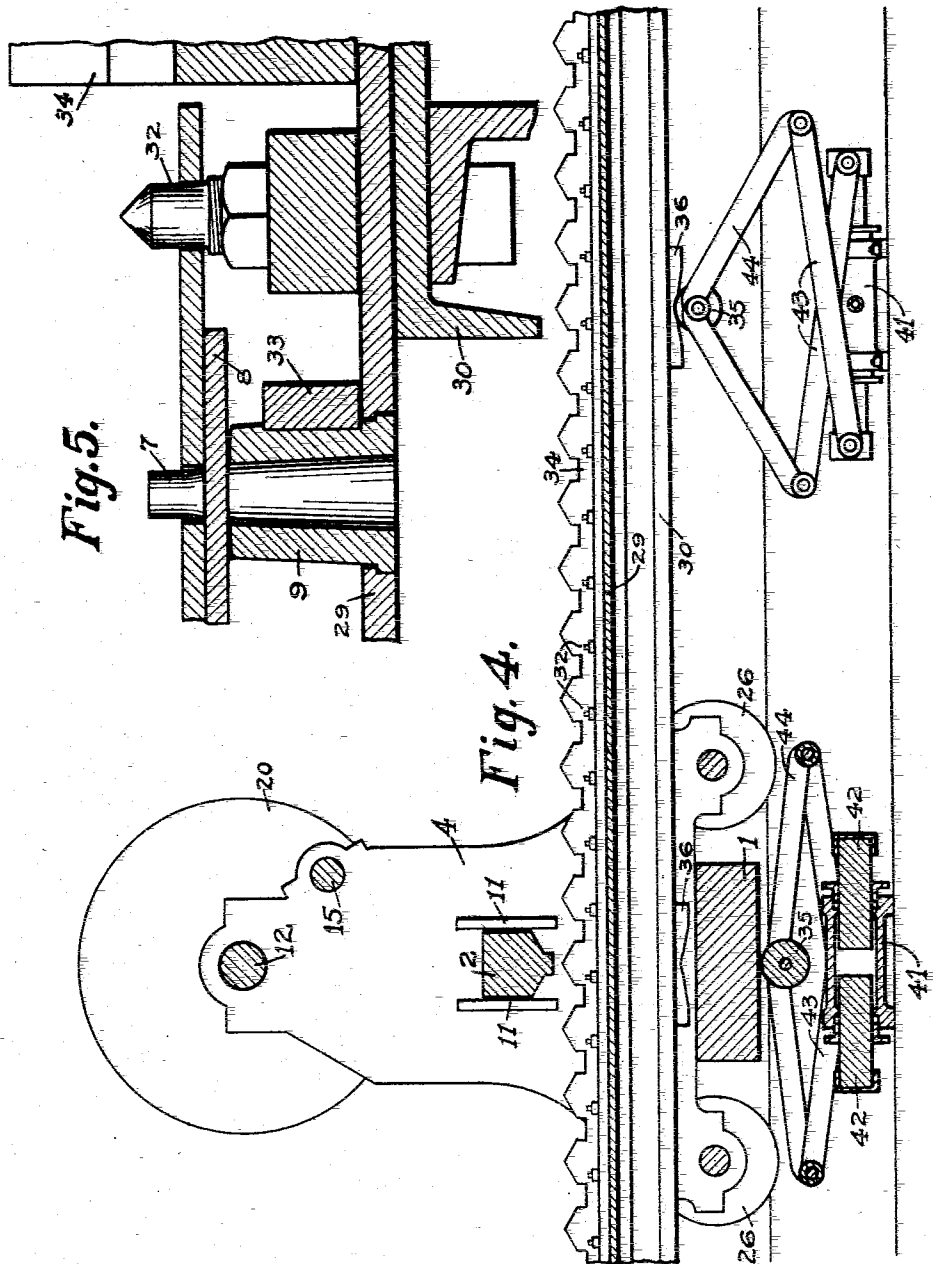
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4 SHEETS—SHEET 4.

Fig. 7.

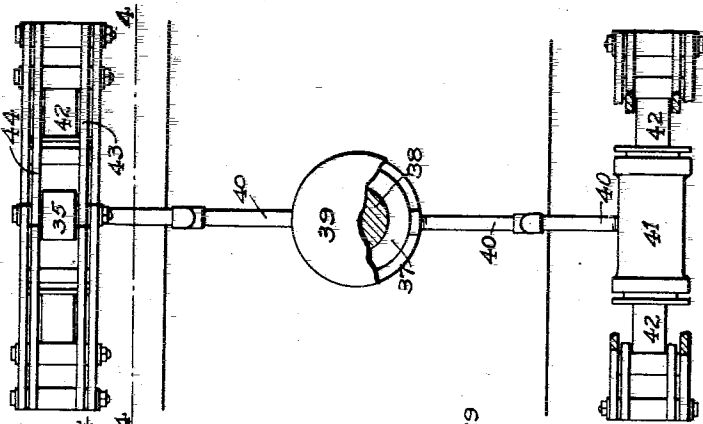
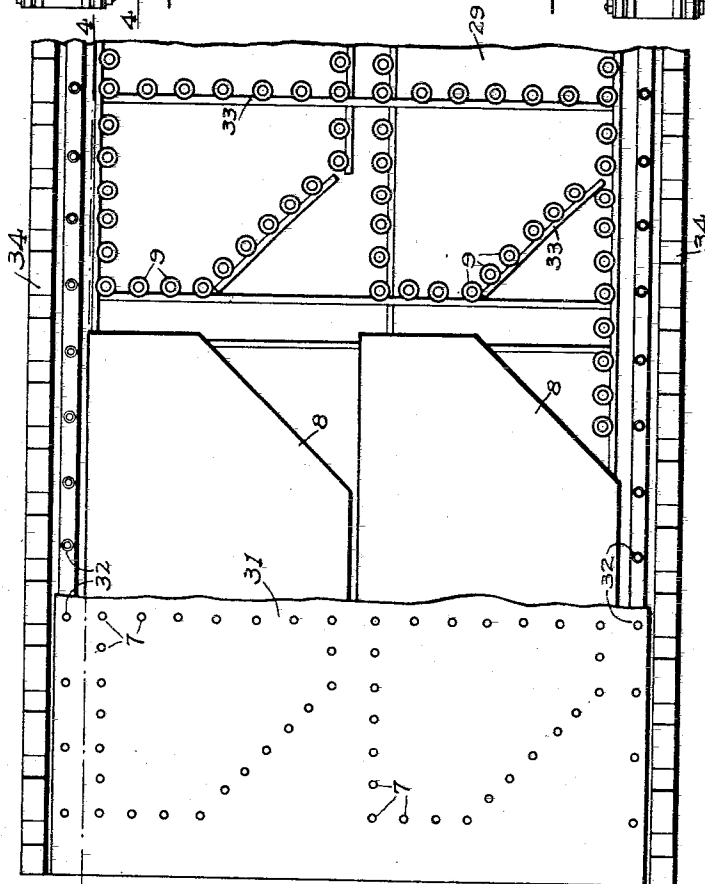


Fig. 6.



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MACHINE FOR PUNCHING HOLES IN METAL PLATES.

939,185.

Specification of Letters Patent.

Patented Nov. 2, 1909.

Application filed March 1, 1907. Serial No. 360,061.

To all whom it may concern:

Be it known that I, CHARLES HOMER CLARK, a citizen of the United States, residing in Columbus, in the county of Franklin and State of Ohio, have invented a new and useful Machine for Punching Holes in Metal Plates, of which the following is a specification.

The object of the invention is to provide for more rapid and accurate work in punching holes in metal plates and other structural material than is attained by existing methods, by a machine to pass over the material, properly arranged to be punched, instead of passing the material through a stationary machine; the machine susceptible of continuous operation, by the punched material being replaced with unpunched material at any point on one or more supporting tables on which the machine has operated and to which it will return in the course of its operation; holes of any desired size or shape, within the capacity of the machine, being made in the material by passing the machine over it once, eliminating the necessity for rehandling the material to two or more machines; any number of like pieces to be punched without marking the several pieces.

The machine having passed to the end of a table may operate in reverse direction on the same table, but preferably should pass upon a turn table or other suitable device for transfer to the end of another table ready for operation, and operate in turn upon two parallel tables, or upon three tables in a triangle or upon four tables in a rectangle, as may be best suited to the shape and extent of floor space and least obstructive to other operations.

The punching means disclosed herein, in which the punches pass out through the dies, is not essential to the present invention, as means for withdrawing the punches can be applied without altering the character of present invention, and the means here disclosed may be used on other punching machines; and for the same reasons mechanical devices for gathering the punches and returning them to a convenient point for redistribution are not shown here.

A further object is to provide improved tool locating templets, together with novel templet holding means.

I attain the objects above enumerated, as the subject of this invention, by means of the

apparatus illustrated on the accompanying drawings, in which—

Figure 1— is an elevation of the machine, a cross-section of the table, and supports for the latter in the position they assume as the machine passes over them; Fig. 2 is a side elevation of the machine and table; Fig. 3 is a cross-section of the machine and table on the line 3—3, Fig. 1; Fig. 4 is a cross-section on the line 4—4, Fig. 1; Fig. 5 is a detail cross-section of a portion of the table; Fig. 6 is a plan of the table and Fig. 7 is a plan of the table supports.

Similar numbers refer to similar parts throughout the several views.

No. 1 is a rest for the table when under pressure from ram 2, hereinafter described, and is also a part of the frame of the machine, being rigidly connected to housings 3 and 4 and to trucks, 5 and 6.

The machine is driven by a motor 19 which is supplied with electric power by a trolley system. Convenience may dictate the arrangement of this trolley system and the controlling devices. On an extension of the shaft of motor 19 is a pinion 18 which drives a gear 17. Said gear 17 drives the machine forward and also operates the ram 2 so that these movements are in predetermined relation to each other, by means hereinafter described.

The forward motion of the machine is induced by gear 17 in mesh with gears 21 rotating shafts 22 which also carry pinions 23 in mesh with gears 24. Said gears 24 rotate axles 25 carrying track wheels 26 on rails 28. Said gears 24 also travel in a rack 27 to prevent slipping of track wheels 26 on rails 28.

The vertical motion of ram 2 is induced by gear 17 in mesh with gear 16 which rotates shaft 15 carrying gears 14. Said gears 14 are in mesh with gears 13 which rotate shaft 12. Said shaft 12 carries eccentrics 10, which raise and lower ram 2 between guides 11 on housings 3 and 4, in predetermined relation to the forward motion of the machine as hereinbefore described. Extensions of shaft 12 carry fly wheels 20 to equalize the work on the machine.

The relation between the forward motion of the machine and the vertical motion of ram 2 is such that the operation of ram 2 presses the punches 7, contained in successive areas of a table which is hereinafter described, through material to be punched 8, without interrupting the forward motion of

the machine. Said table consists of longitudinal supports 30 to which is attached plate 29 carrying dies 9. Said dies 9 are held in position by bars 33 shown in Fig. 5 and Fig. 6. Material to be punched 8 rests directly on dies 9 and is covered by templet 31 in which holes are located for punches 7 over said dies 9 in the positions in which holes are required in material 8. Said templet 31 is held in proper relation to dies 9 in plate 29 by means of extensions to bolts 32 as shown in Fig. 5. Templet 31 contains the required arrangement of holes for the particular material to be punched. Plate 29, however, may also hold dies not required in this arrangement; but representing arrangements for other material and templets.

Punches 7 may be of various lengths, within the area of each operation of ram 2, thus requiring less pressure than would be required to press all of the punches simultaneously. As the forward motion of the machine carrying and operating ram 2 is continuous, it will be seen that during the period of time requisite after the ram in its downward movement comes in contact with the punch until the work of the punch is completed, the table described must itself conform to the forward motion of the machine and ram, which is provided for as follows: On two edges of the table are fastened racks 34, which engage with a tooth on each end of ram 2 shown in Fig. 4, at a position in the downward course of ram 2 and the forward travel of the machine, which causes the table to respond to the movement of the machine throughout the punching operation. As ram 2 recedes from the table the rack 34 is released from the tooth at each end of ram 2, and the table returns to its former position by means hereinafter described.

Attached to the underside of longitudinal pieces 30 of the table, are pieces 36 so formed that the table will return by gravity to its position of rest between the successive pressing operations of ram 2. Said pieces 36 are placed at intervals along the table in contact with rollers 35 which are a part of movable supports. These supports consist of a weight 39 Fig. 1 and Fig. 7, attached to plunger 38 which rests on water in cylinder 37, the latter being connected to cylinders 41 by pipes 40; thus communicating the pressure induced by weight 39, on said water, to plungers 42 in said cylinders 41. Plungers 42 hold the rollers 35 in position under pieces 36 of the table by means of connecting bars 43 and 44. The weight of the machine passing over the supports is sufficient to press down the bars 44 and rollers 35 thus forcing plungers 42 together and raising plunger 38 and weight 39. As the machine passes away from the supports, the latter are gradually released and return to their normal position under the table.

The templet 31 and the punched material may be removed from the table, replacing the latter with unpunched material, by any convenient method, such as an overhead crane, covering the table and sufficient floor space for the purpose. Such a crane may be rendered more efficient by the use of a magnet for lifting the templet, and material.

I claim:

1. In a metal punching machine, dies, punches, a punch locating templet removably positioned with relation to the dies, means apart from the templet for supporting the punches, and press mechanism.

2. In a metal punching machine, dies, loose punches and means for forcing them through the dies, and a templet removably positioned with relation to the dies for locating the punches on the work in register with the dies.

3. In a metal punching machine, dies, punches, a punch-locating templet, means for positioning the templet at varying elevations above the dies, and press mechanism.

4. In a metal punching machine, dies, a punch-locating templet, means for variably spacing the templet from the dies with the latter and the punch-locating positions of the templet in line in the various positions of the templet, and press mechanism.

5. In a metal punching machine, a plurality of dies greater in number than are active at one punching operation, punches, interchangeable punch-locating templets with means for removably positioning them with relation to the dies, each templet having punch holes registering with certain of the dies, means apart from the templets for supporting the punches, and press mechanism.

6. In a metal working machine, operating mechanism having parts at opposite sides of a work support, a work support having greater area than is accessible to the operating mechanism at one time, and means for moving the operating mechanism relatively to the work.

7. In a metal working machine, tools, tool-operating mechanism having normally separated opposing parts, a work support between said parts and of greater area than is accessible to the tool operating mechanism at one time, and means for moving the opposing parts of said mechanism relatively to the support.

8. In a metal punching machine, press mechanism having opposing parts at opposite sides of a work support, a work support between said parts and of greater area than is accessible to the press mechanism at one time, dies, punches, and means for moving the press mechanism relatively to the support.

9. A templet for metal working machines consisting of a metal plate supported at varying elevations within the machine, and

means for holding the templet against lateral movement.

10. In a metal working machine, a work sustained templet supported at varying elevations determined by the thickness of the work, and means for holding the templet against lateral movement.

11. In a metal working machine, a work-supported templet adapted to be lowered onto the work, and vertical devices for maintaining the templet in proper position at varying elevations determined by the thickness of the work.

12. In a metal working machine, upwardly extending templet holding devices, and a work-supported templet adapted to be lowered into engagement with said devices and be supported by the work at various elevations.

13. In a metal punching machine, the combination with a templet-forming plate having punch locating holes and templet holding holes, of projections in the machine which enter the templet holding holes.

14. In a metal punching machine, the combination of a frame, a die holder secured thereto, dies, projections fixed with relation to the die holder and extending upwardly, a punch templet having punch locating and templet holding holes—the latter adapted to receive the said projections, and punches.

15. In a metal punching machine, a plurality of dies greater in number than are active at one punching operation, punches, and interchangeable punch-locating templets movable with relation to the dies and each having punch holes which register with certain of the dies.

16. In a metal punching machine, dies, punches, press mechanism operative at one time on less than the whole number of dies, means for changing the relative positions of the dies and press mechanism, a punch templet consisting of a metal plate having punch locating holes, and means for holding the punch templet and dies in fixed relation to each other.

17. In a metal punching machine, dies, a plurality of interchangeable punch templets each coacting with certain of the dies, and punches.

18. In a metal punching machine, dies, a plurality of interchangeable punch templets each coacting with certain of the dies, means for removably holding the templets in fixed relation to the dies, and punches.

19. In a punching machine, dies, and movable resistance means backing up the dies during the punching operation.

20. In a metal punching machine, dies, a sheet metal templet for supporting the dies, and movable resistance means for backing up the dies during the punching operation.

21. In a metal working machine, a work

support, and operating mechanism having determined movement with relation to the support for operating on successive areas thereof.

22. In a punching machine, a work support, and press mechanism movable horizontally with relation to the support for operating on successive areas thereof.

23. In a metal working machine, work supporting means, opposing operating parts at opposite sides of the latter, and means for moving said opposing parts horizontally to operate on successive areas of the supporting means.

24. In a punching machine, a work support, dies and cooperating punches, and press mechanism movable horizontally with relation to the support for operating on successive areas thereof.

25. In a metal working machine, a work support, tool actuating mechanism movable horizontally with relation to the support for operating on successive areas thereof, and a sheet metal tool locating templet.

26. In a metal working machine, a work support, tool actuating mechanism movable horizontally with relation to the support for operating on successive areas thereof, and cooperating tools and tool templets at opposite sides of the plane of the work.

27. In a metal punching machine, opposing press members, separately removable sheet metal templets, and dies and punches positioned by the templets for the action of the press members.

28. In a metal punching machine, opposing press members, a die templet, removable and interchangeable punch templets, and dies and punches positioned by the templets for the action of the press members.

29. In a metal punching machine, opposing press members, a die templet, removable and interchangeable punch templets separate from and positioned and removed independently of the die templet, and dies and punches positioned by the templets for the action of the press members.

30. In a metal working machine, a work support, intermittently operating opposing parts above and below the support with means for moving said parts along the support, and means for moving the support simultaneously with the said parts during the operating periods of the latter.

31. In a metal punching machine, the combination of a movable frame, a reciprocating head mounted in said frame, and means for moving the frame bodily in determined relation to the movement of the reciprocating head.

32. The combination with a bodily movable press having a reciprocating head, of a table of greater area than said head, means for bodily moving the press along the table, and means for moving the reciprocating

head alternately to and from successive areas of the table.

33. The combination with a bodily movable press, of a table which passes through the frame of said press, and a plurality of movable supports for said table.

34. The combination with a press having a definite bodily movement, of a rectangular table, movable supports for said table located in the path of movement of the press, and means for moving the supports in determined relation to the bodily movement of the press.

35. In a device of the character described, the combination of a die templet, dies carried by said templet, a punch templet having openings adapted to register with said dies, means for causing said punch templet to register with said dies, and press mechanism bodily movable with relation to said templates and adapted to act over successive areas thereof.

36. In a device of the character described, the combination of a removable die templet, a plurality of dies carried by said templet, a detachable punch templet separate from the die templet, means for causing said punch templet to register with the dies, punches, and press mechanism.

37. In a device of the character described, the combination of a die templet, a plurality of dies carried by said templet, a separate and detachable punch templet, means for causing said punch templet to register with said dies, punches, and press mechanism bodily movable with relation to said templates and adapted to act upon successive areas thereof.

38. In a metal punching machine, the combination of a plurality of dies and punches, press mechanism bodily movable with relation thereto, said press mechanism including a ram adapted to force the punches through material to be punched, and driving means common to the press mechanism and ram whereby their movements are in predetermined relation to each other.

39. In a punching machine, the combination of a work support, dies, punches, press mechanism mounted for bodily movement with relation to the support, means for causing the support to move bodily with said mechanism during the punching operation, and means for causing said support to return to its former position after the punching operation is completed.

40. In a punching machine, the combination of a work support, punches, dies, press mechanism mounted for bodily movement with relation to the support, and a plurality of devices normally sustaining said support but adapted to be forced out of engagement

therewith by the press mechanism in its passage.

41. In a punching machine, the combination of a work support, punches, dies, press mechanism mounted for bodily movement with relation to the support, a plurality of devices normally sustaining said support but adapted to be forced out of engagement therewith by the press mechanism in its passage, means for causing the work support to move bodily with the press mechanism during the punching operation, and means for returning the support to its former position after the punching operation has been completed.

42. The combination of a work support, a press mounted for bodily movement with relation to the support, wheels sustaining the press and ways on which the wheels travel, and means affording the wheels non-slipping movement on the ways.

43. The combination of a work support, a press mounted for bodily movement with relation to the support, tracks, track wheels for the press, pinions rotatable with the track wheels, and fixed racks with which the pinions mesh.

44. In a metal punching machine, the combination of a table, dies carried by the table, punches adapted to coact with the dies, a reciprocatory head, a backing up member, and means for imparting bodily movement to the head and backing up member longitudinally of the table.

45. Table supporting means for metal punching machines comprising a member adapted to engage the under side of the table, and a counterbalancing weight which normally holds said member in an elevated position.

46. Table supporting means for metal punching machines comprising toggle members adapted to engage the under side of the table, and a counterbalancing weight which normally holds said members in an elevated position.

47. Table supporting means for metal working machines comprising a cylinder, a piston actuated by fluid in the cylinder to support the table, and a weight sustained by the fluid and maintaining it under pressure.

48. Table supporting means for metal working machines comprising a pair of toggle members, pistons to which said toggle members are connected, a cylinder entered by the pistons, and a fluid sustained counterweight movable in the cylinder and maintaining fluid therein under pressure.

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Witnesses:

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