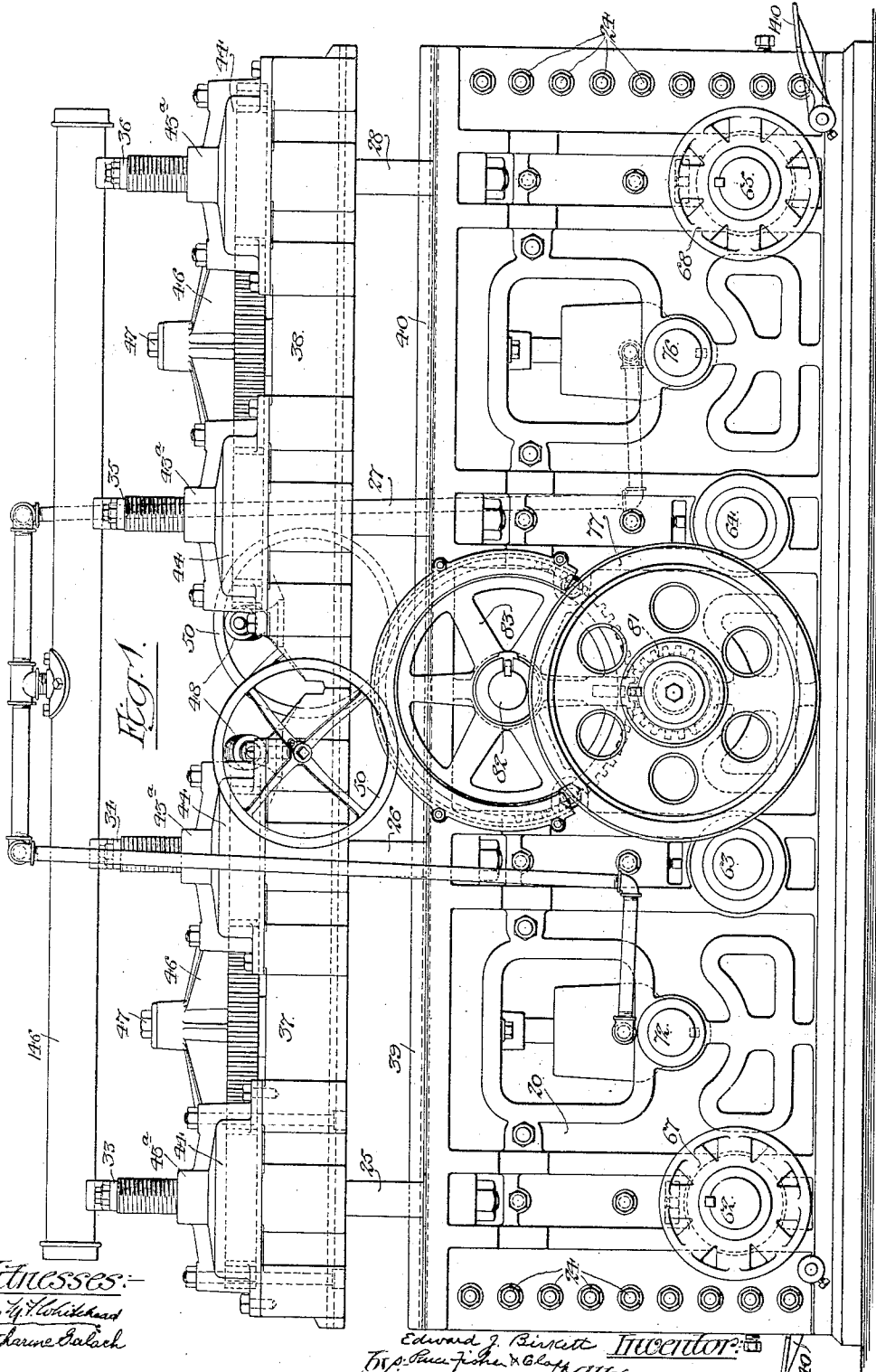


E. J. BIRKETT.  
PUNCHING MACHINE.  
APPLICATION FILED AUG. 5, 1911.

1,056,396.

Patented Mar. 18, 1913.

5 SHEETS—SHEET 1.



Witnesses:  
John H. Whithead  
Hathorne Balach

Edward J. Birkett Inventor:  
T. P. Buehler & Co. Attys:-

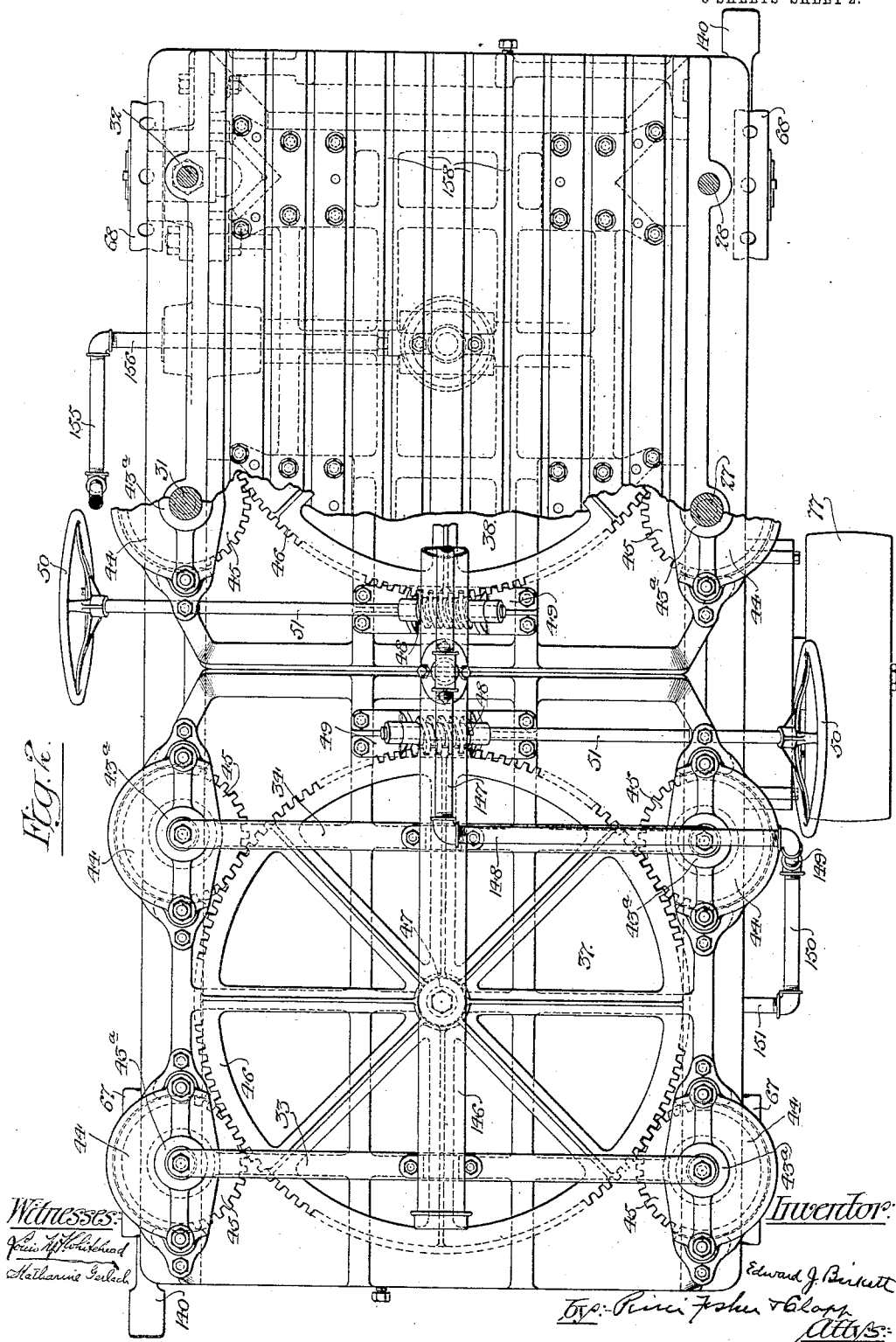
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5 SHEETS—SHEET 2.



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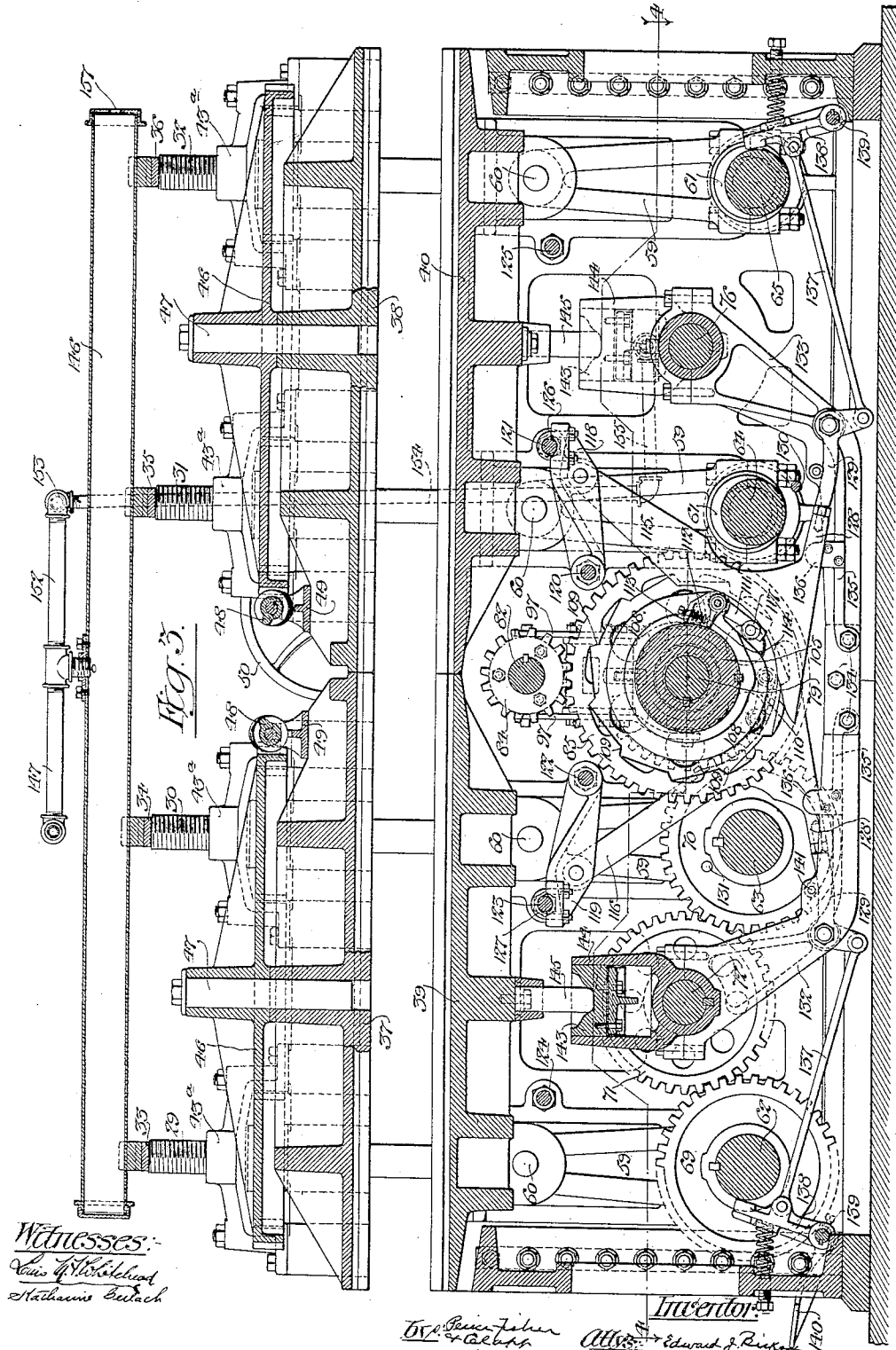
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5 SHEETS—SHEET 3.



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5 SHEETS—SHEET 4.



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6 SHEETS—SHEET 5.

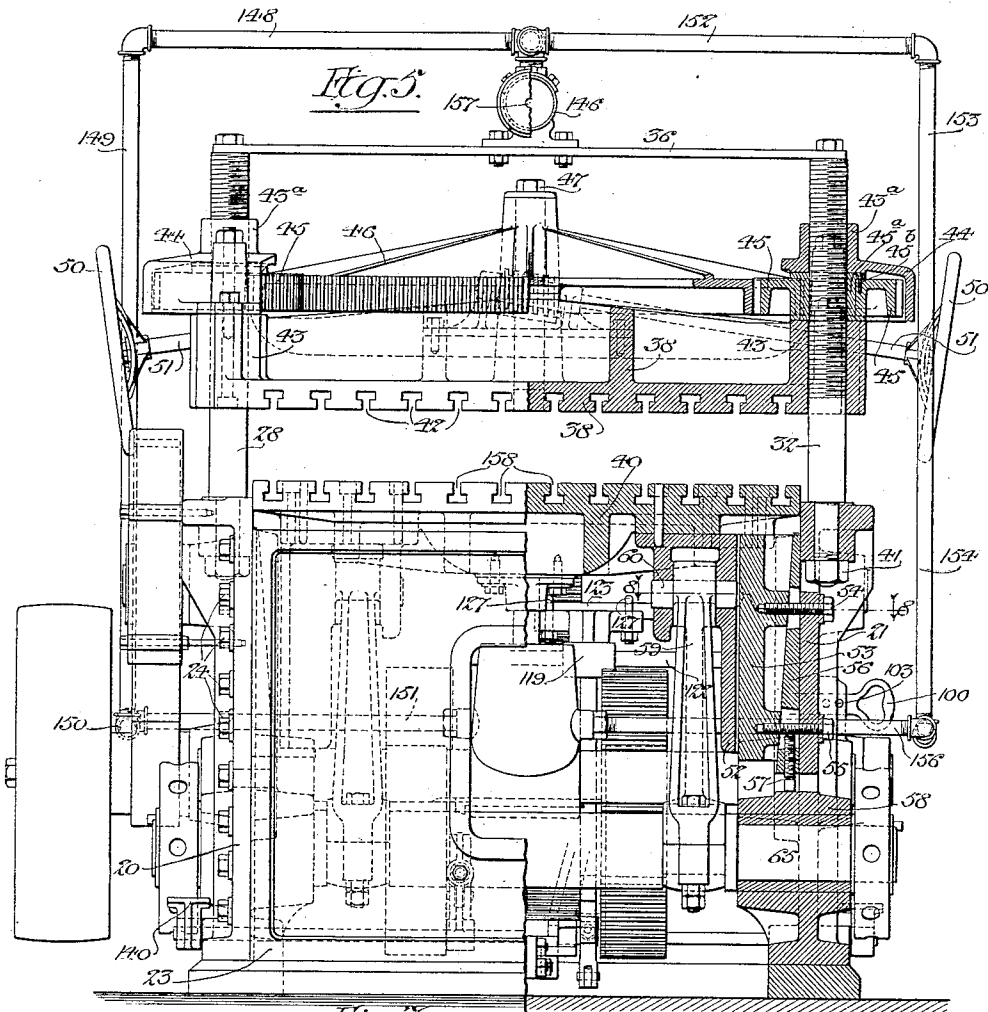
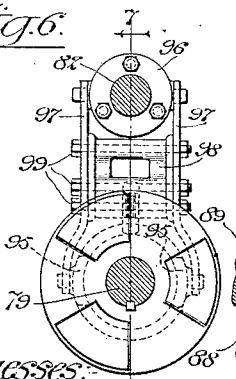


Fig. 6.



Witnesses:

Wm. M. Winkler  
Hartman's Bookshop

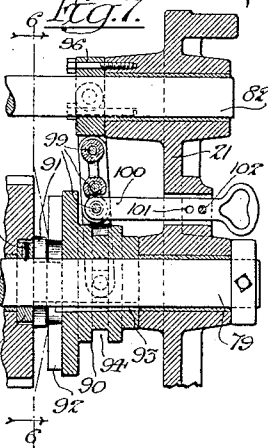
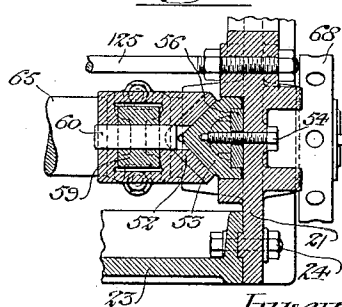


Fig. 8.



Inventor:

Edward J. Birkett  
By: R. W. Fisher & Co.  
Attys.

# UNITED STATES PATENT OFFICE.

EDWARD J. BIRKETT, OF RACINE, WISCONSIN, ASSIGNOR TO J. I. CASE THRESHING MACHINE COMPANY, OF RACINE, WISCONSIN, A CORPORATION.

## PUNCHING-MACHINE.

1,056,396.

Specification of Letters Patent.

Patented Mar. 18, 1913.

Application filed August 5, 1911. Serial No. 642,524.

*To all whom it may concern:*

Be it known that I, EDWARD J. BIRKETT, a citizen of the United States, and resident of Racine, county of Racine, State of Wisconsin, have invented certain new and useful Improvements in Punching-Machines, of which the following is a specification.

The present invention relates to punching machines generally, and more particularly to machines for punching and trimming plates of metal, or like material.

One object of the invention is to provide a machine which will take in sheets of greater dimensions than machines of the prior art, while maintaining the weight of the machine at a minimum.

Another object is to provide a machine which may be used as a single large punching unit, or as a plurality of smaller punching units, thereby increasing its availability for service, and hence its efficiency.

Another object is to provide a novel counterbalance for the table of the machine.

Other objects look to the provision of simple and efficient construction and arrangement and adjustment of parts, together with ease of operation and repair.

In carrying out my invention, I preferably arrange the fixed head of the machine upon the upper portion of the frame which is relatively light; mount the movable table, which coöperates with the head, upon the lower frame members, which are relatively heavy; and locate the actuating mechanism for the table within the inclosure formed by the lower frame members. I also preferably divide the head and table into two sections and arrange for independent adjustment of the head sections and independent, or united, actuation of the table sections. Coöperating cylinders and pistons below the table sections, supplied from a source of compressed air, constitute the counterbalance for the table.

These several objects and features of invention will be more fully understood upon reference to the following detailed description taken in connection with the accompanying drawing, which illustrates the preferred form of my invention, and the scope of the invention will be particularly pointed out in the appended claims.

In said drawings, Figure 1 is a side elevation of a punching machine constructed in accordance with my invention; Fig. 2

is a plan view of the same with a portion of the head structure broken away; Fig. 3 is a central longitudinal section of the same, parts, however, being shown in full, independently of the section; Fig. 4 is a horizontal section of the same, taken on a plane indicated by the line 4—4 of Fig. 3; Fig. 5 is an end elevation of the same with a portion shown in transverse vertical section upon a plane indicated by the line 5—5 of Fig. 4; Fig. 6 is an elevation of a portion of the clutch mechanism employed in coupling the parts together to enable the machine to operate as a single punching unit, parts being shown in section taken upon a plane indicated by the line 6—6 of Fig. 7; Fig. 7 is a vertical section of said clutch mechanism, the section being taken on a plane indicated by the line 7—7 of Fig. 6; and Fig. 8 is a transverse horizontal section of one of the adjustable guides and associated parts by which the movements of the table are controlled, the section being taken on a plane indicated by the line 8—8 of Fig. 5.

Throughout these views, like characters refer to like parts.

Referring to the drawing in detail, 20 and 21 designate the side frame members, and 22 and 23 the end frame members, which are bolted together at their ends by bolts 24, so as to provide a rectangular inclosure in which the greater portion of the operating mechanism of the machine is located. Standards 25, 26, 27, 28, 29, 30, 31 and 32 extend upward from the side frame members 20 and 21 and are connected in pairs at their upper ends by bars 33, 34, 35 and 36. These standards constitute the supporting means for the head of the machine, which is divided into two sections 37 and 38, while the lower frame members 20, 21, 22 and 23 constitute the supporting means for the coöperating table, which is similarly divided into sections 39, 40. Each standard preferably consists of a rod threaded at its upper end and reduced in diameter at its lower end. As illustrated particularly in Fig. 5, the reduced portion of the rod passes through an opening in a flanged portion of the associated side member and is held in place by a nut, as 41 in the case of rod 32, screwed upon its lower end.

The sections 37 and 38 of the head are similarly supported, each upon four of the

standards—section 37 upon standards 25, 26, 29 and 30; and section 38 upon standards 27, 28, 31 and 32. Each head section consists of a casting having a working face on its under side provided with T-shaped grooves 42 and having apertured sleeve portions 43 through which the standards extend. Castings 43<sup>a</sup>, also apertured for the passage of the standards, are suitably secured to the top of the adjacent portions of the head sections and are provided with overhanging housings 44, which protect pinions 45, having threaded engagement with the threads upon the standards and journaled between the castings 43<sup>a</sup> and the sleeve portions 43. By the rotation of the pinions 45, the head sections are adjusted vertically toward and from the corresponding sections of the table. The threaded engagement between the pinions 45 and the standards is provided by threading a bushing 45<sup>a</sup> to fit the threads upon the rod and securing said bushing within the bore of the pinion, as by screws 45<sup>b</sup>. In order that the pinions 45, associated with the standards of each section, may be moved uniformly and in unison, they are arranged to mesh with a large gear-wheel 46, journaled upon a stud shaft 47, extending upward from the center of each section. Obviously, the rotation of this gear-wheel will transmit the same motion to each of the pinions 45 and all parts of the particular section of the head will be simultaneously and uniformly adjusted.

Any desired means may be employed for rotating the gear-wheel 46. I preferably, however, employ a worm 48, meshing with the teeth of the gear-wheel 46 and journaled in a suitable bearing 49 upon the top of the adjacent portion of the section of the head. This worm may be actuated in any suitable way, as by means of the hand-wheel 50 upon the end of the rod 51. As before explained, each section of the head is provided with the same adjusting mechanism, but, for convenience and to provide a similar relation of the parts when the machine is operated as two independent punching units, the hand-wheels 50 of the two sections are arranged on opposite sides of the machine. In this way, the operator at either end of the machine will always find the hand-wheel 50 at his right. The sections 39 and 40 of the table are also similarly mounted and the means for guiding and reciprocating each are the same. As illustrated by the dotted lines in Fig. 2, each table section is provided with four guide-ways and cooperating guides. One of these is illustrated in detail in Figs. 5 and 8.

The guide-ways are designated 52 and each extends downward from the under side of the table section at a point near its corner. As here illustrated, this guide-way

constitutes a V-shaped trough into which a cooperating V-shaped guide 53 fits. This guide is secured to the adjacent side frame by means of screws 54 and 55, which extend through openings in the side frames into threaded engagement with the guide. In order to adjust the guide toward and from the guide-way, a wedge 56 is positioned between the guide 53 and the adjacent portion of the side frame. The engaging portions of the guide and wedge are similarly and oppositely inclined. The adjusting movement of the wedge 56 is brought about by a screw 57 having threaded engagement with the lower portion of the wedge and resting upon the bearing 58, formed in the side frame. The rotation of the screw 57 will bring about a movement of the wedge 56, which will force the guide 53 toward or from the guide-way 52, in accordance with the direction of movement of the screw. By this movement, the parts may be adjusted as desired. When the guide is finally positioned, the screws 54 and 55 may be tightened up so as to more firmly hold the parts.

Just as each section of the table is guided by four cooperating pairs of guides and guide-ways, so each section is supported and reciprocated by four eccentric rods 59. These rods are of substantial construction because of the weight of the table and because they are used in transmitting power from the driving source to the work upon the table. Each is secured at its upper end to the under side of the table, preferably by a pin 60, extending through portions of the guide-way 52, which is made sufficiently heavy to provide such a connection. At its lower end, each is sleeved upon an eccentric 61, mounted upon a suitable driving shaft. The shafts upon which these eccentrics are located are designated 62, 63, 64 and 65, shafts 62 and 63 being associated with section 39 of the table, and shafts 64 and 65 with section 40. These shafts are journaled at their ends in bearings 58 and 66 formed in the side frames 21 and 20, respectively; and the shafts 62 and 65 are extended slightly beyond these side frames so that the wheels 67 and 68 may be keyed thereto. These wheels are provided with peripheral openings for the insertion of a hand-bar, or similar device, to enable the different table sections to be moved by hand. Shafts 62 and 63 have the gear-wheels 69 and 70 keyed to them, and these in turn mesh with an intervening idle gear-wheel 71, mounted loosely upon a transverse fixed shaft 72, extending between the side frames 20 and 21. Similarly, shafts 64 and 65 have gear-wheels 73 and 74 keyed to them and these gear-wheels mesh with an intervening gear-wheel 75 mounted upon the transverse fixed shaft 76, also extending between the side members 20 and 21. The gear-wheels 69, 70, 71,

73, 74 and 75 are all of the same size. Consequently, all parts of either section of the table will be given the same vertical movement upon the movement of either associated shaft.

The entire machine is adapted to be driven from a pulley 77, keyed to a sleeve 78, loosely journaled upon the shaft 79, journaled in the bearings 80 of the side frames 20 and 21. A gear-wheel 81 is, in turn, keyed to the sleeve 78. A countershaft 82 is located directly above the shaft 79 and is similarly journaled in bearings in the side frames. This shaft also extends beyond the side frame 20 and a gear-wheel 83 is keyed to this extended portion of it. The pinion 81 and the gear-wheel 83 mesh with each other. About midway of the side frames 20 and 21, the countershaft 82 has the pinion 84 keyed to it; and directly beneath it, is the gear-wheel 85, mounted loosely upon the shaft 79. The pinion 84 and the gear-wheel 85 are also in mesh with each other. From this arrangement of pinions and gears, it therefore follows that motion will be transmitted from the pulley 77 to the gear-wheel 85 and that the latter will run at a much lower speed than the former. This proportion of speed, of course, may be varied, as desired. And because of this arrangement, it also follows that the gear-wheel 85 will be constantly driven so long as the pulley 77 is connected to a suitable driving source. It is from this wheel 85 that the shafts 62 and 63 on the one hand, and 64 and 65 on the other, are driven. In the former case, this result is brought about through a gear-wheel 86, mounted loosely upon the shaft 79 and meshing with wheel 70; and in the latter case, through a gear-wheel 87 keyed to the shaft 79 and meshing with gear-wheel 73. By clutching the pinion 86 to the constantly driven wheel 85, the section 39 of the table may be actuated; and by clutching the pinion 87 to the same wheel, the section 40 of the table may be actuated. On the other hand, the table sections may be actuated together, as a single unit, by connecting the pinions 86 and 87 to the shaft 79 so that they will operate in unison; then, whichever gear-wheel 86 or 87 is thrown into clutch with the wheel 85, both will be actuated and both sections of the table will be moved as a unit.

The mechanism by which the pinion 86 is clutched to the shaft 79, so as to bring about this uniform and simultaneous movement of the table sections, is illustrated especially in Figs. 6 and 7. As explained, the gear-wheel 86 normally runs loose upon the shaft 79. It is maintained in its proper lateral position by means of the collar 88 secured to the shaft 79 by a set screw 89. The side of the gear-wheel 86 adjacent to the clutch member 90 is provided with segmen-

tal projections 91, which coöperate with the segmental projections 92 upon the member 90 to lock the wheel 86 to the member 90. The latter member is free to move longitudinally upon the shaft 79, but cannot rotate upon said shaft by reason of the feather 93 seated in a groove in the shaft and coöperating with a groove in the member 90. In consequence of this construction, the movement of the clutch member 90 upon the shaft 79 will cause the gear-wheel 86 to rotate with the shaft 79, just as the gear-wheel 87 does by reason of its keyed connection to it. The desired movement of the clutch member 90 may be brought about in any preferred way. As here illustrated, the exterior of this member is provided with a groove 94 in which the shoes 95 of a yoke rest. This yoke is pivoted to a ring 96 secured to one end of the bearing of the shaft 82. The side members 97 of the yoke are rigidly held in position by an intervening spacing plate 98 and associated bolts 99. A link 100 is connected at one end to one of the bolts 99 and extends through a suitable opening in the side frame 21, where it terminates in a handle. It will be apparent that when the link 100 is pushed inward, the gear-wheel 86 will be brought into mesh with the clutch member 90 and will, from that time on, be in position to rotate with it and the shaft 79. When the link 100 is drawn outward, the gear-wheel 86 will be free to continue its rotation independently of the shaft 79. The clutch member 90 may be held in either this engaging or non-engaging position by means of a pin passed through the holes 101 or 102 in the link 100 and a coöperating hole in the adjacent rib of the side frame 21. When the link 100 is drawn outward, the pin will pass through the hole 101, as indicated by the sectioning of the pin in Fig. 7; and when the link 100 is pushed inward, then the pin will be passed through the hole 102 in the link. In each of these instances, the pin will occupy the same hole, designated 103, in the rib of the side frame.

The mechanism, by which the constantly driven wheel 85 is thrown into and out of clutch with the adjacent gear-wheels 86 and 87, may now be considered. These gear-wheels are provided with projections 104 and 105, which extend over the hub 106 of the wheel 85. The projection 104 has a ring 107 keyed to its outer periphery, and projection 105 has a similar ring 108 similarly positioned. The inner faces of the rim of the wheel 86 are provided with ratchet teeth 109 on either side of the central web. These teeth, therefore, lie in the planes of the rings 107 and 108, respectively. Each ring 107 and 108 carries a spring-pressed dog. The dog carried by ring 107 is designated 110, and that carried by ring 108 is design-

nated 111. As indicated in the case of ring 108, the dog is pivoted directly to the ring and has its free end spring-pressed by a spring 112, acting between a lug 113 on the ring and a tail 114 on the dog. When unrestrained, the springs associated with the dogs force them into engagement with the teeth 109 of the wheel 85; and the latter, rotating in the direction of the arrow, as shown in Fig. 3, transmits its motion through the dog to the ring 107, or 108, as the case may be, and thence to the corresponding gear-wheel 86 or 87, to cause the actuation of the associated table section. Normally, these dogs are held out of engaging position by means of control members 115 and 116. These members are narrow plates of irregular shape which extend edgewise between the gear-wheel 87 and the wheel 85 in the one instance, and between the gear-wheel 86 and the wheel 85 in the other. Each dog is provided with a roller 117, which projects outward from the wheel 85 into the plane of the associated control member. The upper ends of the control members 115 and 116 are pivoted to castings 118 and 119, respectively. The former of these is supported by rods 120 and 121. The latter is supported by corresponding rods 122 and 123. These rods, together with the rods 124 and 125, are stay-rods extending between the side frame members 20 and 21 and are threaded at their ends and secured in position by bolts, as illustrated in the case of rod 125 in Fig. 8. The castings 118 and 119 are provided with openings at one end, through which the rods 120 and 122, respectively, pass, and are secured at their opposite ends to the rods 121 and 123, respectively, by yokes 126 and 127. Each of the control members 115 and 116 is provided with a tail 128, which normally abuts against the end of a bell crank stop 129. When in this position, the control members engage the rollers 117 on the dogs 110 and 111 and hold them so that they will not drop into engagement with the teeth of the rotating wheel 85. However, as soon as either bell crank lever 129 is actuated, the corresponding control member will be free to drop under the action of gravity and thereby allow the associated dog to fall into the path of movement of the teeth of the wheel 85 and thereby clutch the corresponding train of gearing to this constantly driven wheel. The resulting rotation of the gearing, however, is instrumental in bringing the corresponding control member back to its normal position. This is brought about by means of pins 130 and 131 upon the gear-wheels 73 and 70, respectively. Considering the case of the control member 115, it will be observed that if it is in its tripped position, the pin 113, upon sufficient rotation of the wheel 73, will engage the adja-

cent edge of the member 115 and move it about its pivot toward the shaft 79. When in this position, the bell crank lever stop 129 is free to engage the tail 128 and hold the member 115 in its normal position. The action of the pin 130 upon the member 115 is such as to bring its forward end into a position to engage the roller 117 before the train of gears has stopped its movement. The oncoming roller 117 is engaged by the cooperating edge of the member 115 and gradually draws the dog 111 out of engagement with the teeth 109, thereby unclutching the associated gear-wheel 87. The bell crank stops, although lying in planes upon opposite sides of the gear-wheel 85, are mounted upon a common frame which extends between the fixed shafts 72 and 76. This frame is made up of the members 132 and 133, bolted together by bolts 134. Each is formed with a rib 135, which carries an upwardly projecting guide 136, which assists in keeping the control members 115 and 116 in proper position. The bell crank levers 129 are connected by rods 137 to cranks 138 secured to transverse shafts 139, journaled in the side frame members 20 and 21 adjacent to the end frame members 22 and 23, respectively. One shaft 139 extends slightly beyond the side frame member 20, while the other similarly extends slightly beyond the side frame member 21. Each is provided at its outer end with a foot-lever 140. The crank 138 is adapted to engage the adjacent shaft 62, or 65, as the case may be, to limit its motion in one direction. A coiled compression spring, acting between it and the adjacent portion of the end frame, normally holds the crank against the shaft and the foot-lever in its elevated position. The bell crank stops 129 also have their return movements limited by conical pins 141 and 142 upon the members 132 and 133, respectively. When either foot-lever 140 is depressed, the associated bell crank stop is moved out of engagement to free the associated control member. The result is the clutching of the corresponding train of gearing with the constantly driven gear-wheel 85, followed by the return of the control member to its normal position and the consequent unclutching of the train of gearing. The period when the train remains in clutch is sufficient to insure one complete rotation of the eccentric shafts 62 and 63, or 64 and 65, as the case may be, with a corresponding up-and-down motion of the associated table section. Of course, if the clutch member 90 has been operated so as to couple both wheels 86 and 87 to the shaft 79, then the operation of either foot-lever will result in one complete up-and-down movement of both sections of the table operating as a single unit.

In order to counterbalance the weight of the table sections, each section has a piston

143 and cylinder 144 associated with it. The piston is secured to a piston-rod 145 extending downward from the center of the table section, and the cylinder is mounted directly upon the intermediate fixed shaft 72 in the one case, and 76 in the other. A suitable source of compressed air, or the equivalent, is arranged so as to supply compressed air to these cylinders beneath their pistons. In the present instance, a reservoir 146 is located on the top of the structure, resting directly upon the bars 33, 34, 35 and 36 and being properly secured to them. Pipe connections extend from this reservoir to the cylinders 144. Pipes 147, 148, 149, 150 and 151 extend from the center of this reservoir 146 to one of these cylinders, and pipes 152, 153, 154, 155 and 156 from the center of the reservoir to the other cylinder. The reservoir may be supplied from any suitable source, and an opening 157 is shown for making a compressed air connection to the reservoir. By suitably regulating the pressure of the air, the weight of the table sections will be counterbalanced. The table sections 39 and 40 are provided with T-shaped grooves 158 similar to the grooves 42 in the head sections. These grooves are of the usual construction and are employed for holding the dies and punches, shears and other similar tools, in position for working upon the material.

From the above description, it will be apparent that the machine may be operated as a single punching unit by throwing the clutch member 90 into clutching position, in which event the operator may use either foot-lever 140, or it may be operated as two independent punching units. In the latter event, one operator stands at each end of the machine and each head and table section operates independently of the other. When thus used, each operator finds the foot-lever at his left and the adjusting hand-wheel 50 at his right.

In carrying out my invention, it will be apparent that certain alterations and modifications may be made without departing from its spirit. I, therefore, do not wish to be limited to the exact matter illustrated, but aim to cover all such alterations and modifications by the terms of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is:—

1. A punching machine comprising connected side frames, a head secured to the upper portion of said side frames and having a working face on its under side, a movable table mounted between and guided upon said side frames beneath said head, and having a cooperating working face on its upper side, operating shafts journaled in said side frames below said table, connections between said shafts and said table for raising and

lowering said table to and from said head, a drive shaft journaled in said side frames below said head, gearing connecting said drive shaft and said operating shafts, operator controlled mechanism for connecting said gearing to said drive shaft and means for automatically throwing said gearing out of operation at the end of the lowering movement of said table, substantially as described.

2. A punching machine comprising lower connected side frames, corner standards fixed to and extending upwardly from said side frames, a rectangular head mounted at its corners upon said standards, a movable table guided between said side frames beneath said head, mechanism mounted in said side frames beneath said table for raising and lowering the same to and from said head, and a common adjusting mechanism cooperating with each of said standards for adjusting said head vertically thereon, substantially as described.

3. A punching machine comprising lower frame members, a plurality of standards fixed to and extending upwardly from said members, a head mounted on said standards, adjusting devices connected to said head and engaging and cooperating with said standards, gearing carried by said head for simultaneously operating said adjusting devices, a movable table mounted upon said lower frame members beneath said head and means for raising and lowering said table to and from said head, substantially as described.

4. A punching machine comprising lower frame members, a plurality of standards fixed to and extending upward from said members, a head mounted upon said standards, a movable table mounted upon said lower frame members, means for moving said table toward and from said head, an adjusting device cooperating with each standard for moving the adjacent portion of the head relative to it, and common driving means for said several adjusting devices mounted on said head to insure a uniform adjustment of said head relative to said standards.

5. A punching machine comprising lower frame members, a plurality of threaded rods fixed to and extending upward from said members, a head, pinion actuated nuts threaded upon said rods and journaled in adjacent portions of said head, a movable table mounted upon said lower frame members, means for moving said table toward and from said head, a gear-wheel mounted on said head and meshing with said several pinions, and a hand-wheel for operating said gear-wheel to adjust said head upon said rods.

6. A punching machine comprising lower connected side frames, corner standards

fixed to and extending upwardly from said side frames, a rectangular head mounted at its corners on said standards, pinion actuated nuts threaded on said fixed standards and journaled in adjacent portions of said head, a gear mounted upon the upper face of said head on a vertical axis centrally located with respect to said standards, said gear meshing with all of said pinions, a worm and hand wheel for adjusting said gear, a movable table mounted between said lower frame members beneath said head and mechanism for raising and lowering said table to and from said head, substantially as described.

7. A punching machine comprising relatively movable members, one of said members being divided into sections, and power driven mechanism for operating said sections together as a unit and also separately and independently as a plurality of units.

8. A punching machine comprising a head, a relatively movable table divided into sections, and power driven mechanism for operating said sections together as a unit and also separately and independently as a plurality of units.

9. A punching machine comprising a frame, a head secured to the upper portion of said frame and having a working face on its under side, a relatively movable table mounted in said frame beneath said head and divided into sections having working faces on their upper sides, and power driven mechanism for reciprocating said sections together as a unit and also separately and independently as a plurality of units.

10. A punching machine comprising a frame, a head secured thereto, a relatively movable table mounted in said frame and divided into sections, a drive shaft, separate mechanisms for connecting said drive shaft to said table sections, separate clutches for throwing said mechanisms into operation, and means for connecting said mechanisms for operating said sections as a unit.

11. A punching machine comprising a frame, a head secured thereto, a table movable to and from said head and comprising separate sections, separate operating mechanisms for said sections, a drive shaft, separate clutches for connecting said drive shaft to said sections, means for automatically disengaging said clutches after a predetermined movement of said sections and a clutch for connecting said separate mechanisms and compelling the operations of said sections as a unit.

12. A punching machine comprising a frame, a head secured to the upper portion of said frame and having a working face on its under side, a relatively movable table mounted in said frame beneath said head and divided into sections having working faces on their upper sides, a power driven

member, independent mechanisms for reciprocating said sections, and means for severally throwing said mechanisms into and out of gear with said member and for coupling said mechanisms together and throwing them into and out of gear with said member.

13. A punching machine comprising relatively movable head and table members, each divided into sections, means for reciprocating the sections of one member together as a unit and also separately and independently as a plurality of units, and means for separately and independently adjusting the sections of the other member relative to the first.

14. A punching machine comprising a frame, a head secured to the upper portion of said frame and having a working face on its under side, a relatively movable table mounted in said frame beneath said head and having a working face on its upper side, said head and table being divided into co-operating sections, means for reciprocating the table sections together as a unit and also separately and independently as a plurality of units, and means for separately and independently adjusting the head sections relative to said table.

15. A punching machine comprising a frame, a vertically movable table mounted on said frame, power operated mechanism for raising and lowering said table, a co-operating cylinder and piston acting between said frame and table, and a compressed air supply and connections for supplying air to said cylinder to counterbalance said table.

16. A punching machine comprising a frame, a head mounted upon the upper portion of said frame and having a working face on its under side, a vertically movable co-operating table mounted on said frame beneath said head and having a working face on its upper side, power operated mechanism for raising and lowering said table to and from said head, downwardly extending pistons secured to said table, co-operating cylinders mounted upon said frame, a compressed air supply tank mounted upon said frame, and supply connections from said tank to said cylinders, whereby the air pressure counterbalances the weight of the table.

17. A punching machine comprising connected side frames, corner standards fixed to and extending upwardly from said side frames, a rectangular head mounted at its corners upon said standards, adjusting mechanism mounted on said head co-operating with each of said standards for vertically adjusting said head, a table vertically guided between said side frames below said head, a pair of operating shafts journaled in said side frames beneath said table, op-

erating rods connected to the under face of said table adjacent the corners thereof, cranks on said operating shaft engaging the lower ends of said rods, a common drive shaft journaled in said side frames, gearing connecting said drive shaft and said operating shafts, and an automatically disengaged clutch for throwing said gearing into and out of operation.

10 18. A punching machine comprising connected side frames, standards fixed to said side frames and extending upwardly therefrom, a head comprising separate sections adjustably mounted on said standards, a  
15 table comprising separate sections vertically guided between said side frames, separate operating mechanisms beneath and connected to the sections of said table, a common drive shaft, independent clutch mechanisms for connecting said common drive  
20 shaft to the separate operating mechanisms of said table sections and a clutch for connecting said separate mechanisms to compel the simultaneous operation thereof.

25 19. A punching machine comprising a frame, relatively movable head and table members mounted on said frame, power driven mechanism for reciprocating one of said members, and means for adjusting the  
30 other of said members comprising a plurality of screw threaded rods fixed to said frame, whereon said adjusting member is

mounted, pinion actuated nuts threaded on said rods and journaled in adjacent portions of said adjusted member and a com- 35 mon gear mechanism mounted on said adjusted member for rotating said pinions.

20. A punching machine comprising a frame, relatively movable head and table members mounted on said frame, one of said 40 members being divided into sections, a common drive shaft, separate mechanisms for connecting said drive shaft to said sections, separate clutches for throwing said mechanisms into operation, and means for con- 45 necting said mechanisms for operating said sections as a unit.

21. A punching machine comprising a frame, relatively movable head and table sections mounted on said frame and both di- 50 vided into sections, mechanisms for separately adjusting the sections of one of said members, separate operating mechanisms for the sections of the other of said members, a common drive shaft, independent clutch 55 mechanisms for connecting said common drive shaft to said separate operating mechanisms, and a clutch for connecting said separate mechanisms to compel the simultaneous operations of said sections as a unit. 60

EDWARD J. BIRKETT.

Witnesses:

GEORGE F. FISHER,  
KATHARINE GERLACH.