No. 655,597. Patented Aug. 7, 1900.

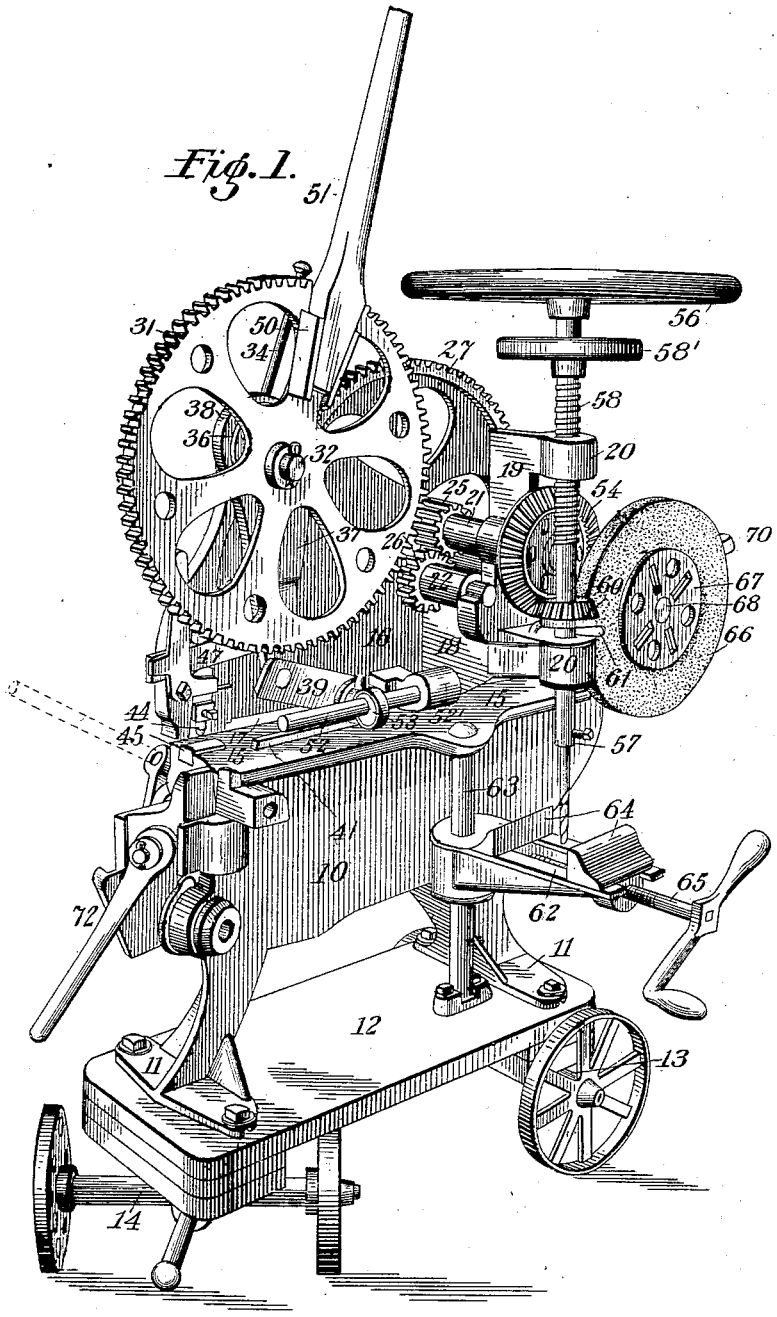
R. BATES.

COMBINED METAL WORKING MACHINE.

(Application filed Feb. 16, 1900.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



Witnesses

B. L. Foster.

H. J. Berenhof

By Inventor Robert Bates,

E. G. Siggers

Attorney

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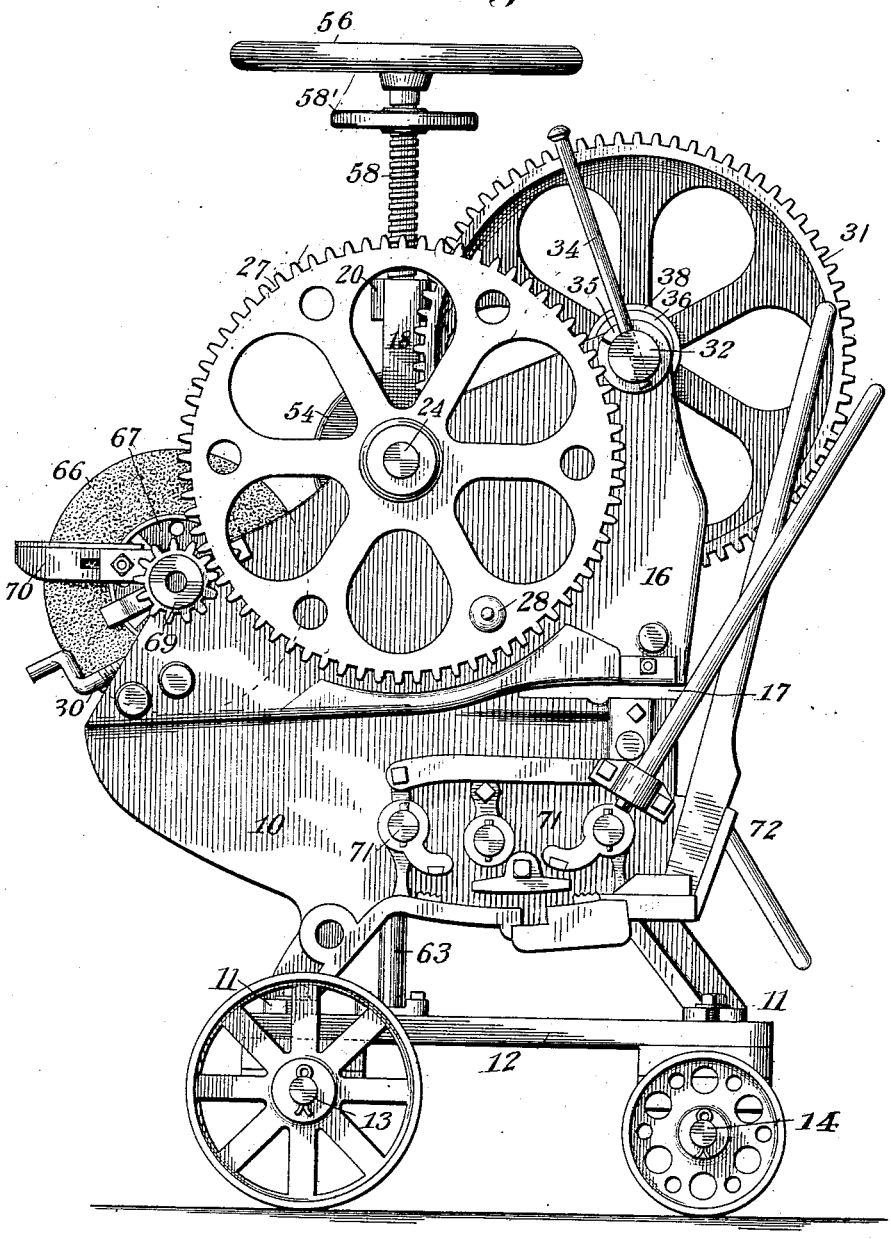
Fig. 2.



Witnesses

B. S. Foster.

W. J. Berulop

By

Inventor

Robert Bates,

E. G. Siggers

Attorney

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(No Model.) 3 Sheets—Sheet 3.

Fig. 3.

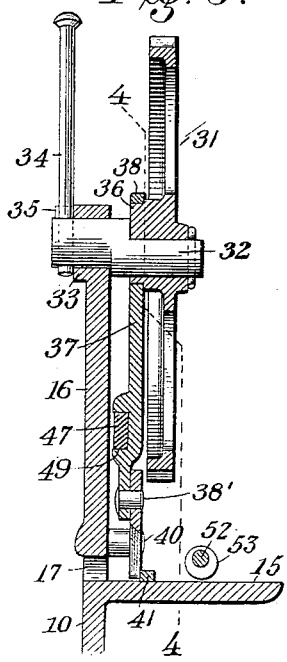


Fig. 4.

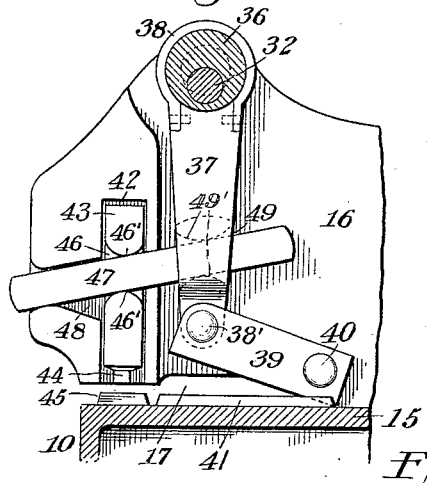


Fig. 5.

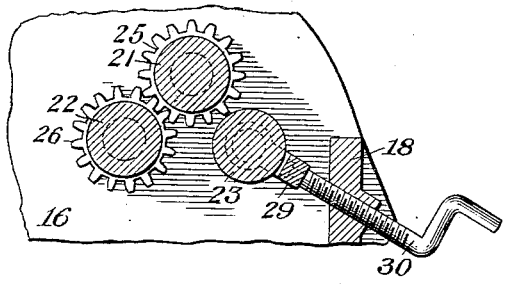
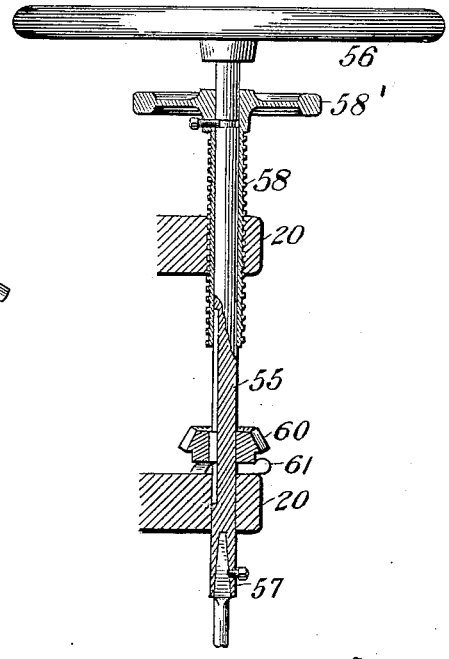


Fig. 6.



Witnesses
R. G. Foster.
H. G. Bennett

Inventor
Robert Bates,
By E. G. Siggers
Attorney

UNITED STATES PATENT OFFICE.

ROBERT BATES, OF GRAND RAPIDS, WISCONSIN.

COMBINED METAL-WORKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 655,597, dated August 7, 1900.

Application filed February 16, 1900. Serial No. 5,484. (No model.)

To all whom it may concern:

Be it known that I, ROBERT BATES, a citizen of the United States, residing at Grand Rapids, in the county of Wood and State of Wisconsin, have invented a new and useful Combined Metal and Wood Working Machine, of which the following is a specification.

My invention relates to a combined metal and wood working machine designed for use by blacksmiths and other artisans for performing a variety of useful kinds of work on metal or wood.

The primary object in view is the production of a compact machine which in its entirety is comparatively simple in construction and viewed from the standpoint of the number of mechanisms embodied therein is economical in cost as compared with a like number of single machines adapted to be operated individually for the performance of the same kinds of work which is capable of being accomplished on and by the single machine of my invention.

A further object is to operatively mount on a single frame the following machanisms—namely, a punch mechanism, a shearing mechanism, a roll-bending mechanism, an abrading mechanism and lathe-chuck, a boring or drilling mechanism, a work-clamp or vise, an upsetting mechanism, and an angle bending mechanism. With certain of these mechanisms is associated a power appliance adapted to operate either of said certain mechanisms, and this power appliance is itself capable of being driven by a continuous rotary motion or by a lever. Certain of the mechanisms are equipped with means by which they may be thrown out of operative relation to one another and to the power mechanism, so that it may be said that the mechanisms are adapted for use individually.

Further objects and advantages of this invention will appear in the course of the subjoined description and the novel combinations of mechanisms and the construction and arrangement of parts will be fully pointed out in the claims.

In the drawings, Figure 1 is a perspective view of a combined metal and wood working machine constructed in accordance with my invention. Fig. 2 is an elevation thereof taken from the opposite side to that shown in Fig. 1. Fig. 3 is a sectional view through the means employed for operating the punch and the shears. Fig. 4 is a sectional view through the punching mechanism and the shearing mechanism in the plane of the dotted line 4 4 of Fig. 3. Fig. 5 is a detail sectional view through the roll-bending mechanism. Fig. 6 is a sectional elevation of a part of the drill mechanism.

The same numerals of reference are used to indicate like and corresponding parts in each of the several figures of the drawings.

10 designates the bed which supports each and all of the mechanisms embodied in the machine of my invention. This bed is shown by the drawings as provided with the enlarged footpieces 11, which are firmly secured to a wheeled base 12 for the purpose of making the apparatus portable, and thereby facilitate its movement around a workshop; but it is evident that the base may be omitted and that the bed may rest on or be secured to a floor, thus making the machine a stationary one and requiring the work to be brought to it. As shown, the base is provided with a rear fixed axle 13, having suitable wheels; but the front axle 14 is pivotally connected in any suitable way with the front part of the base, so as to be capable of turning freely beneath the same and thereby enable the entire structure to be turned around within a space equal to the length thereof, such arrangement and adaptation facilitating the handling of the apparatus. The bed 10 is provided with a table-surface 15, and from this bed rises the jaw 16, which is spaced with relation to the table-surface so as to provide an intermediate horizontal slot 17, adapted to permit the passage of metal of either sheet, bar, or rod form through the same and to or from the shearing mechanism or the punching mechanism, as may be desired. The upright jaw 16 is furthermore provided with a laterally-extending bracket 18, which is located just in rear of the table-surface 15, and from this bracket extends the post 19, which is equipped with vertically-alined bearings 20, provided for the accommodation of the parts comprising the drilling or boring mechanism, as will hereinafter appear.

The bracket 18 supports the operating parts of the roll-bending mechanism, which in-

cludes a series of rolls 21 22 23, arranged in opposing relation one to the other for the purpose of feeding and bending a straight metallic bar into a curved or circular condition, each of said rolls having a shaft journaled in proper bearings provided by the bracket. The shaft of the roll 21 is extended beyond its bearings, so that one end of the roll-shaft receives the main or power wheel 27, which is in the form of a large gear-wheel having a suitable operating-crank 28, the latter being adjustably fastened to the wheel, as shown by Fig. 2, and being made fast with the roll-shaft for the purpose of driving the roll-bending mechanism. The roll 21 is provided with a wide-faced gear 25, a part of which meshes with a gear 26, provided on the roll 22, which is arranged in coöperative relation to the roll 21, so that the two rolls serve as the means for feeding a bar or rod of metal through the bending mechanism, the roll 22 being driven from and in an opposite direction to the roll 21 by the intermeshing gears. The other roll 23 of the set of bending-rolls is disposed in parallel relation to the roll 21, so as to coöperate therewith in bending the metallic bar or rod, and this roll 23 is mounted for adjustment with relation to said roll 21 for the purpose of varying the curvature which may be imparted to the bar or rod. Said roll 23 is journaled in suitable adjustable bearings, and in one embodiment of the invention I have provided the bearings in a yoke 29, which is slidably or movably mounted on the bracket 18, so that it may be adjusted through the medium of a screw 30, the latter finding a suitable loose bearing on the bracket and having a threaded connection with the yoke.

The gear 25 on the shaft of the bending-roll 21 is adapted to operate a transmitting-gear 31 as well as the gear 26 on the bending-roll 22, said transmitting-gear being operatively connected with the punching mechanism and with the shearing mechanism. This transmitting-gear is mounted idly on an axle 32 to turn or rotate freely thereon, and this axle is eccentrically mounted in a bearing 33, which is provided on the jaw 16 of the machine-frame. The purpose of mounting the axle eccentrically in the bearing is to effect a shiftable adjustment of the transmitting-gear with relation to the gear 25 on the bending-roll shaft 24, so that the transmitting-gear may be thrown into and out of mesh with the gear 25. This object is attained by the described mounting of the axle 32, and with this axle is associated a shipping arm or lever 34, which in one position is adapted to engage with and be held against movement by a locking-lug 35, which is provided on the jaw 16 adjacent to the shaft-bearing. The arm or lever 34 is shown by Fig. 2 as being made fast with one end of the axle or shaft 32, and this arm is arranged in a position for convenient access, so that it may be turned for the purpose of rocking the shaft on its axis, and thereby effect the adjustment of the gear 31 into and out of mesh with the gear 25. This gear or wheel 31 is provided with an eccentric 36, which is made fast with the wheel, so as to turn therewith. The eccentric is operatively related to a lever 37 by the means of a strap 38, which is secured to or made integral with the lever in a manner to frictionally embrace the eccentric. This lever operates the movable jaw 39 of a metal-shears, said jaw being pivotally connected, as at 38', to the lower extremity of the lever. The movable jaw of the shears is fulcrumed at its other end on the frame-jaw 16, as at 40, and this movable jaw coacts with a fixed shear-blade 41, provided on the table 15 of the machine. The lever 37 is also arranged to actuate the metal-punching mechanism, which is partly contained in a guide-socket 42, the same being formed in the overhanging jaw 16. A punch-shank 43 is slidably confined in this guide-socket for vertical reciprocating movement, said shank being provided with the punch 44, that is arranged to coact with the anvil 45, occupying a stationary position on the table 15 in vertical alinement with the shank. This shank 43 is provided with a transverse opening 46, which forms two bearing edges 46' for a lever 47, which is thereby loosely connected with the movable member of the punch. This lever passes through the opening of the punch-shank, and one end of the lever is received in a transverse flared opening 48, provided in the overhanging jaw 16, this flared opening constituting the fulcrum for the lever. The other end of the lever is loosely received in a slot 49 of the eccentric-operated lever-arm 37, said slot being provided with rounded bearing edges 49', which permits the lever to rock or turn on the movement of the lever-arm 37. The pivoted member of the shears and the lever which operates the movable punch member serve to restrict the lever-arm 37 to reciprocation in a vertical direction under the influence of the eccentric on the transmitting gear or wheel 31, and this lever-arm is thus adapted to operate the shears and the punch mechanism simultaneously and from a single source of power. It is to be observed that the transmitting gear or wheel is adapted for operation from a rotary power-wheel; but I do not desire to confine myself to this specific means for the operation of said transmitting gear or wheel, because I have provided means by which the wheel or gear may itself be operated by lever-power. This wheel is provided on one side thereof and within the gear-teeth with a lever-socket 50, in which is inserted a lever 51, said lever being held in the socket by a wedging action.

The lever 51 may be removed from the socket and the transmitting-gear thrown into mesh with the gear on the bending-roll 21, thus making provision for the operation of the shearing mechanism and the punching mechanism through the train of connections from the power-wheel 27; but said transmit-

ting-gear may be thrown out of mesh with the bending-roll gear and the lever 51 inserted in the socket of the transmitting-gear, whereby the latter may be turned for the operation of the shear and the punch by lever-power.

Although I have shown the power-wheel 27 as provided with a hand-crank, it is evident that this wheel may be driven by power from a line-shaft or a motor of any appropriate character.

In the operation of shearing a metallic plate, bar, or rod the work is placed on the table so as to pass through the slot 17 and beneath the movable jaw 39 of the shears; but in the movement of this gear-wheel the work is liable to become displaced. In order to hold work firmly in place on the table, I employ a horizontal rod 52, which is arranged above and parallel to the table, one end of said rod being secured in any approved way in a socket-lug 52′ on the bracket 18 or the frame-jaw, and loosely mounted on this stop-bar is a work-gripping cam 53, which is eccentrically arranged, so that it may be turned on its axis into and out of position to permit of the introduction or removal of the work. This cam is also adapted to accommodate work which may vary in thickness, and it is shiftable longitudinally on the rod to suit work which may vary in width. The gripping-cam may act by gravity in holding the work down upon the table; but, if desired, suitable means may be employed for locking the cam in its adjusted position.

I will now proceed to describe the drilling or boring mechanism, and in this connection the shaft 24 of the bending-roll 21 is provided at the end opposite to the power-wheel with a bevel-gear 54, which drives the drill-spindle 55. Said spindle passes vertically through a tubular feed-screw 58, which is mounted in the alined bearings 20 to have a threaded engagement with the upper bearing, and on the upper end of said spindle is a balance-wheel 56, while the lower end of the spindle is provided with a bit-socket 57. The feed-screw is equipped with a hand-wheel 58′, disposed below the balance-wheel of the drill-spindle, for the purpose of adjusting the tubular feed-screw, and thereby move the bit to and from the work. A bevel-pinion 60 is keyed on the drill-spindle, so as to rotate the latter and provide for its longitudinal feed through the medium of the tubular screw 58, and said bevel-pinion is adapted to be thrown into and out of mesh with the bevel-gear 54 through the action of an adjusting-cam 61, which is interposed between the lower bearing 20 and the bevel-pinion 60. This cam coacts with suitable surfaces on the hub of the bevel-pinion, so as to lift the latter in one position of the cam, and thereby hold the bevel-pinion in mesh with the pinion 54; but a reverse adjustment of the cam allows this pinion 60 to drop out of mesh with the gear 54. The work is sustained below the drill on a table 62, which is pivotally mounted on a post 63, the latter being secured firmly to the wheeled base 12 and the bed 10, whereby the table may be moved out of position and alongside of the bed. This table is slotted, as shown by Fig. 1, and on the table is provided a pair of gripping-jaws 64, one of which is movable relatively to the other, whereby the jaws are adapted to grip the work to hold the same stationary below the drill-spindle, and the jaws may serve as a vise in holding work to be operated on by hand. As a means for adjusting the movable jaw I have shown a screw-spindle 65, which is mounted at one end in a suitable bearing and engages with a traveling nut on the movable jaw.

My machine also contemplates the employment of an abrading mechanism, which includes an emery or other grinding wheel 66. This abrading mechanism is disposed in rear of the bending-rolls and is supported on the frame of the machine. The abrading-wheel is fitted on a chuck or face-plate 67, adapted to serve as a part of a lathe mechanism, and this face-plate is fast with a horizontal shaft 68, the latter being journaled in suitable bearings on the frame-jaw 16 of the bracket 18. One end of this shaft is provided with a gear-pinion 69, which is adapted to be moved into or out of mesh with the power-wheel 27, thus making provision for throwing the abrading mechanism into and out of operative relation to the main power-wheel of the combined machine. If desired, I may employ an extensible clamp 70 for holding the tool or other work in proper relation to the periphery of the abrading-roll, said clamp thus serving as a tool-rest and being operatively related to or supported on the bracket 18.

On one side of the machine I have shown a metal-upsetting mechanism 71 mounted on the bed 10, and at one end of said bed is supported an angle-bending mechanism 72; but as these mechanisms constitute the subject-matter of other applications filed by me of even date herewith I do not consider it necessary to particularly describe either of said mechanisms.

I desire to call attention to the fact that each and all of the several mechanisms of my combined machine are mounted or supported on a single frame, which is especially constructed or designed to carry all of the mechanisms, and that these mechanisms are arranged for service individually and without interfering one with the other. It is thought that the operation will be readily understood from the foregoing description taken in connection with the drawings.

Changes within the scope of the appended claims may be made in the form and proportion of some of the parts, while their essential features are retained and the spirit of the invention is embodied. Hence I do not desire to be limited to the precise form of all the parts as shown, reserving the right to vary therefrom.

Having thus described the invention, what I claim is—

1. A combination-machine of the class described comprising a supporting-frame, a rotatable power-gear mounted on the frame, a bending mechanism driven by said power-gear, a drilling mechanism actuated by the bending mechanism, an abrading mechanism geared with the power-gear, punching and shearing mechanism having a common operative connection with said power-gear, and means for shifting the said connection out of operative relation to the power-gear, to permit of the punching and shearing mechanisms being actuated independent of the remaining mechanisms.

2. A combination-machine of the class described, comprising a supporting-frame, a rotatable power-gear, punching and shearing mechanism having a common operative connection with said power-gear, and means for shifting said connection out of operative relation to the power-gear to permit of the punching and shearing mechanisms being actuated independently thereof, substantially as set forth.

3. A combination-machine of the class described, comprising a frame, a power mechanism including a rotatable gear, a punch, shears, a transmitting-wheel, means for shifting the transmitting-wheel into and out of operative relation to the rotatable gear of the power mechanism, and common means, actuated by the transmitting-wheel, for operating the punch and shears, substantially as set forth.

4. A combination-machine of the class described comprising a suitable frame, a power mechanism including a rotatable member, a punch, shears, a transmitting-wheel cooperating with the rotatable element of the power mechanism and having an eccentric, a lever operatively related to the eccentric and connected with the movable element of the shears, and means, operated by the lever, for actuating the movable element of the punch, substantially as set forth.

5. A combination-machine of the class described comprising a frame, a power device including a transmitting-wheel having an eccentric, a punch including a reciprocatory member, shears including a swinging blade member, a lever actuated by said eccentric and connected directly with the movable shear member, and a second lever loosely working in openings respectively in the reciprocatory punch member and the said eccentric-actuated lever, substantially as set forth.

6. A combination-machine of the class described comprising a frame, a power mechanism including a rotatable member, a punch, shears, a transmitting-wheel, operatively connected with the punch and shears, and means for shifting the transmitting-wheel into and out of operative relation to the said rotatable member of the power mechanism, substantially as set forth.

7. A combination-machine of the class described comprising a suitable frame, a power mechanism including a rotatable member, a punch, shears, a shaft eccentrically journaled on the frame, a transmitting-wheel loosely mounted on the shaft and coöperating with the rotatable member of the power mechanism, means for rocking the said shaft to throw the transmitting-wheel into and out of gear, and means, actuated by said transmitting-wheel, for operating the punch and shears, substantially as set forth.

8. A combination-machine of the class described comprising a frame having a table, and a punch and shears working over the table, common actuating means for the movable members of both the punch and the shears, a horizontal rod fixed to the frame and arranged parallel to the table at one side of the plane of the punch and shears, and a shiftable work-clamp supported by the rod, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ROBERT BATES.

Witnesses:
D. B. PHILLEO,
F. J. WOOD.