(No Model.) 2 Sheets—Sheet 1.

A. BEAUDRY.

PRESS FOR THE PUNCHING, SHEARING, &c., OF METALS.

No. 362,566. Patented May 10, 1887.

Fig. 1.

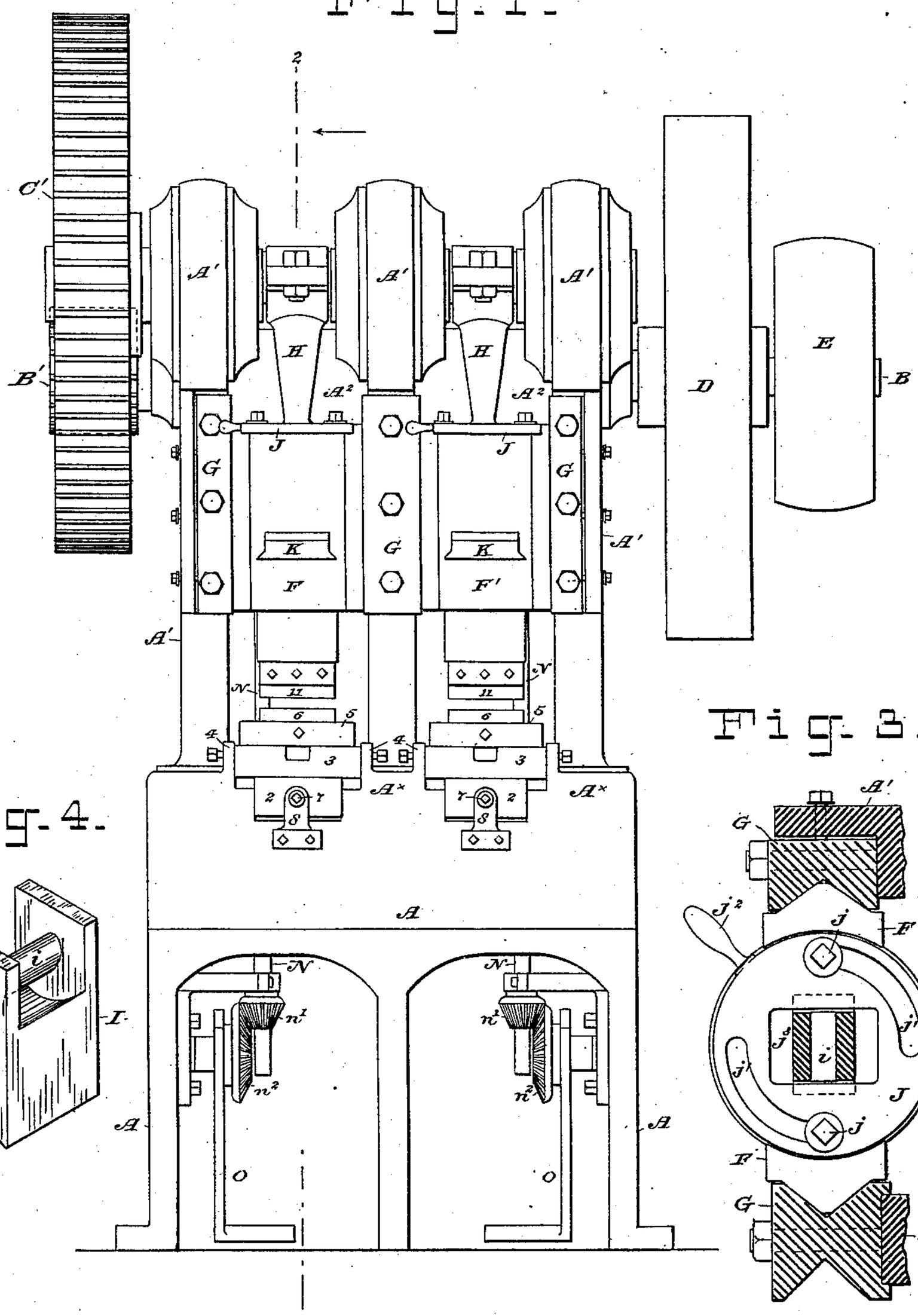

Fig. 3.

Fig. 4.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

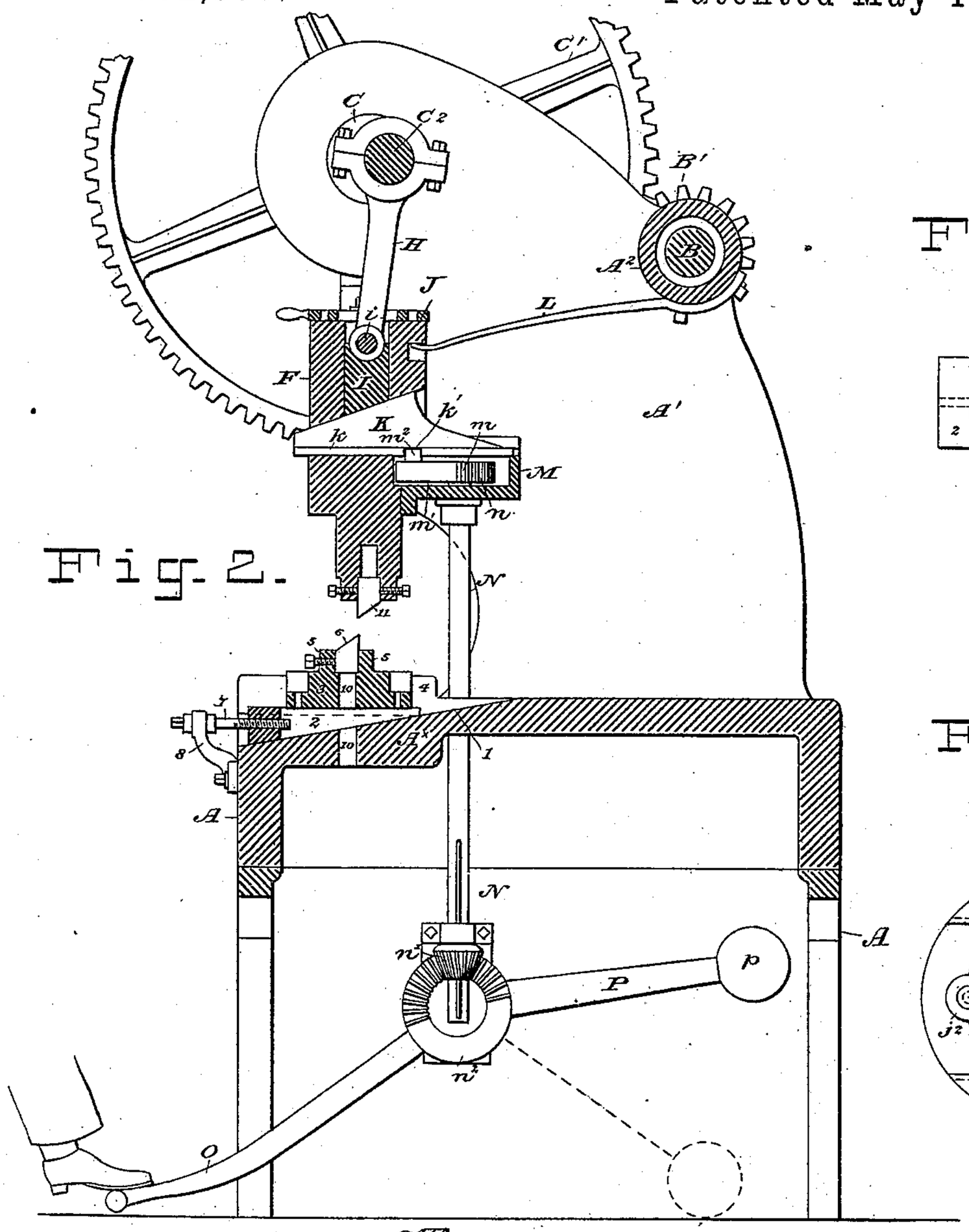


Fig. 6.

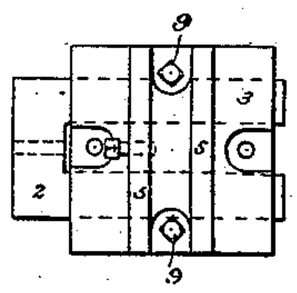


Fig. 7.

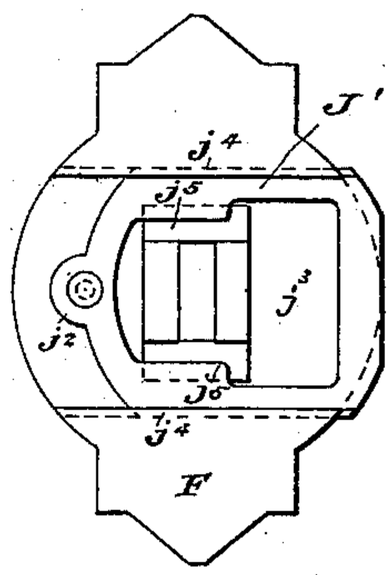
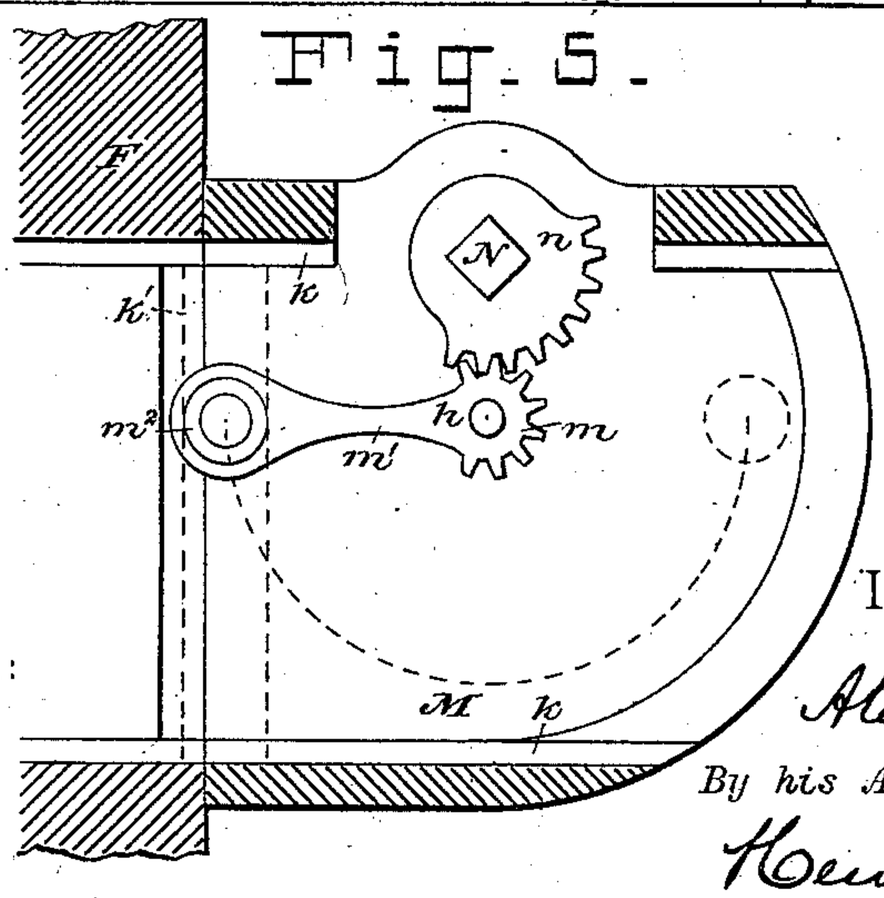


Fig. 5.



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H. Kaplinger.

INVENTOR:

Alexander Beaudry

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Henry Connett

UNITED STATES PATENT OFFICE.

ALEXANDER BEAUDRY, OF BOSTON, MASSACHUSETTS.

PRESS FOR THE PUNCHING, SHEARING, &c., OF METALS.

SPECIFICATION forming part of Letters Patent No. 362,566, dated May 10, 1887.

Application filed November 20, 1886. Serial No. 219,463. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER BEAUDRY, of Boston, Suffolk county, Massachusetts, have invented certain Improvements in Presses for the Punching, Shearing, &c., of Metals, of which the following is a specification.

My invention relates to that class of metal-working machines having reciprocating rams constructed to carry punches, dies, &c., which operate on the metal placed on a bed or stationary die under the ram; and the object of my invention is to provide a convenient means of modifying the stroke of the ram, and of wholly disengaging the ram from the connecting-rod, when desired.

My invention will be hereinafter fully described, and its novel features carefully defined in the claims.

In the drawings, which serve to illustrate my invention, Figure 1 is a front elevation of my machine, showing how a series of rams and their accessories may be actuated from one crank-shaft. The drawings show two rams, but any number may be thus arranged and employed. Fig. 2 is a vertical section taken substantially in the plane indicated by line 2 2 in Fig. 1. Fig. 3 is a plan of the ram on a scale double that of Figs. 1 and 2. This view shows the guides of the ram in section. Fig. 4 is a view of the coupling-slide in perspective. This view is on about the same scale as Fig. 3. Fig. 5 is a plan view, enlarged, of the gearing for actuating the transverse slide, that will be hereinafter described. Fig. 6 is a plan of the device for holding and adjusting the lower or fixed tool. Fig. 7 illustrates a modification, that will be fully described hereinafter.

Let A represent a strong frame or bed-piece provided with uprights A′ cast integrally therewith. These uprights are connected by tubular ties A^2, in which are provided journals for a driving-shaft, B. In the heads of the uprights A′ are formed bearings, in which is rotatively mounted a crank-shaft, C, which is driven from shaft B through the medium of a pinion, B′, on the latter, and a spur-wheel, C′, on the former. D is a fly-wheel on shaft B, and E is a driving-pulley on said shaft.

F F′ are the two rams mounted to play in vertical guides G G. As the rams and their accessories are alike in construction, a description of one will serve for both.

C^2 is a crank in shaft C, and to this crank is coupled a connecting-rod, H, the lower end of which is coupled to a pin, *i*, in a coupling-slide or sliding block, I, (seen detached in Fig. 4,) which fits and plays in a mortise or way in the upper part of ram F. Mounted on the top of the ram (see Fig. 3) is a plate, J, which is secured to the ram by two screws, *j j*, that pass through curved slots *j′ j′* in said plate. These screws serve to attach the plate to the ram, and at the same time to permit it to be rotated a quarter-revolution thereon, the curved slots serving as limiting-guides. A handle, j^2, on the plate may be employed to shift or rotate it. In the plate J is formed a central rectangular oblong aperture, j^3, which is large enough, when the plate is turned to the proper position, to allow the slide I to play through it; but when the plate stands as in Fig. 3, with the longer axis of aperture j^3 at right angles to the longer axis of the rectangular slide, the latter cannot pass through, but takes under the plate, as indicated by the dotted lines in Fig. 3. The purpose of this device is to enable the ram to be conveniently disengaged from its reciprocating mechanism, for reasons that will be hereinafter explained.

Through the ram F is formed an aperture, extending transversely from front to rear, the upper face of which is inclined, and into this transverse aperture opens the mortise or way in which the slide I plays. The lower end of this slide I is beveled or inclined, the inclination of the bevel being the same as that of the incline of the upper face of the transverse aperture in the ram.

K is a transverse slide, with an incline formed on its upper face corresponding to that on the upper face of the transverse aperture in the ram, and this slide K is mounted in dovetail guides at *k*. The slide K enters the ram from the back and is free to play in and out under the coupling-slide I.

L is a spring secured to the tubular tie A^2, and its free end arranged to take under a shoulder on the ram. This spring is designed to counterbalance the weight of the ram and its accessories.

The operation so far as described is as follows:

Shaft C being set in motion, the connecting-rod H imparts a reciprocating movement to the coupling-slide I. If the plate J be turned, as in Figs. 2 and 3, and the transverse slide K stands at the forward end of its path, as seen in Fig. 2, then the ram F must partake in full of the movement of the slide I, as the latter will be closely embraced between the said plate J and transverse slide K, and no vertical play of slide I independently of the ram will take place. Now, if the transverse slide K be moved back to the other end of its path, the coupling-slide I will find nothing below it in its path, and it will merely play up and down in the ram without the latter partaking of the movement. The spring L will support and uphold the ram. If the transverse slide K be moved only part way back, the slide I will act on the ram to depress it only at the latter part of the downward movement of said slide, the whole extent of movement of the ram being then equal to the whole extent of movement of the slide I, less the space left below slide I at the end of its upstroke by the displacement of slide K.

If the operator desires to lower the ram at any time, or stop its movement for the time in order to adjust the die or tool it carries, he rotates plate J a quarter-revolution by means of handle thereon, and this allows slide I to play freely through said plate. Thus the ram is practically uncoupled from the crank, although the proportion of the parts will be such that the slide I will never be withdrawn from the ram, no matter what may be the respective positions of the parts.

The transverse slide K is actuated by mechanism that I will now describe, premising that the said slide is carried by the ram in the reciprocating movements of the latter.

M is a box, either formed integrally with ram F or attached rigidly to the same at the back. The keepers or guides in which the slide K plays extend from the ram out into the sides of box M, and the slide extends out rearwardly into said keepers, as seen in Fig. 2.

Under slide K in box M is mounted a pinion, m, which has an arm, m', carrying a bowl or stud, m^2, which projects upward into a cross-groove, k', formed in the lower face of slide K. This groove is indicated by dotted lines in Fig. 5. By a half-rotation of pinion m the arm m' will swing round and retract the slide K, moving it back or out of the ram, (to the right in Figs. 2 and 3.) The extent of movement of slide K is equal to twice the length of arm m'. The curved dotted line in Fig. 5 indicates the path of bowl m^2.

In order to be able to rotate pinion m', I mount in box M a toothed-wheel segment, n, which is mounted on the upper end of a shaft, N, which has a collared bearing in box M. The segment-wheel n meshes with pinion m. Shaft N extends down through the machine-bed, and on its lower part is splined a bevel-pinion, n', which meshes with a bevel spur-wheel, n^2, mounted on a stud on a bracket, n^3, on the machine base or frame. An arm from this bracket provides a bearing for the lower end of shaft N. To the wheel n^2 is attached a treadle, O, and to said wheel n^2, on the opposite side, is attached an arm, P, bearing a weight, p.

The operation is as follows: The pressure of the workman's foot on treadle O, as seen in Fig. 2, keeps the transverse slide K pressed forward under the slide I, and the ram then makes its full working-stroke. When in this position the inclined meeting faces of the slides I and K do not act to force back wedge K′ when the ram descends and is doing work, for the reason that the line of thrust is coincident with a line passing through the axes of bowl m^2 and pinion m, and this thrust cannot rotate said pinion. If the workman removes his foot from the treadle, weight p will rotate wheel n^2, and through the intermediate mechanism rotate pinion m and retract slide K. This permits the crank-shaft C to continue its rotation without effecting any movement of the ram. If the workman depresses the treadle O far enough to move the slide K inward—say to half the extent of its full movement—the ram will then have imparted to it a movement equal to one-half that due to the throw of crank C^2. In this case, as the arm m' will then stand at right angles to the line of thrust, the workman is enabled to control with his foot the pressure of the punch or other tool carried by the ram. For example, if there is a punch in the ram, the workman may adjust the plate to be punched on the bed or anvil as nearly as he can, and then depress treadle O gradually, thus setting the ram in motion with a gradually-increasing stroke. As the punch thus nears the plate the workman is enabled to adjust the latter to the punch. If the punch should strike the plate no harm will be done, as the resistance thus offered will drive back slide K and the punch will not penetrate the plate. When the adjustment of the plate is thus perfected, the workman depresses the treadle to the full extent and the punching is effected.

If the punch or tool "sticks" in the plate after the punching operation, the engagement of slide I with plate J will serve to withdraw it, as this engagement compels the ram to rise with the said slide I. When the ram is disengaged from the slide I, by rotating the plate J, as has been described, the ram may be drawn down to the desired extent, and when down may be temporarily held in that position by a set-screw or other equivalent means.

I contemplate, for convenience of operation, arranging two, three, or more rams in one series or gang, and providing one with shears for shearing metal, another with a punch, and another with a press, die, or "former" for shaping or swaging the metal.

I provide my machine with an adjustable holder to receive the fixed tool—as a shear-blade, for example—the moving tool or blade being carried by the ram. This holder is illus-

trated in Figs. 1, 2, and 6, the latter view showing the holder in plan.

In the bed A×, below the ram, is formed a recess with an inclined bottom, 1, on which rests a forked wedge-like plate, 2, the upper surface of which may be horizontal. On this plate 2 rests a holder-plate, 3, which is arranged between two flanges or keepers, 4 4, on the bed of the machine. On the upper surface of plate 3 are cross-ribs 5 5, between which is placed a tool, 6, which is held steady by one or more set-screws. The wedge-plate 2 may be moved in or out under plate 3, so as to raise or lower the latter, by means of a collared screw, 7, rotatively mounted in a bracket, 8. In the plate 3 (which is square) are four holes equally spaced, and two screws, 9 9, screw through two of these holes and down into the bed of the machine. This construction enables plate 3 to be turned round at right angles to the position seen in Fig. 6, and secured to the bed in either position. When the vertical adjustment has been effected by the wedge-plate 2, the screws 9 9 are tightened up, as well as set-screws which pass through keepers 4 4 and bear on the edge of plate 3. In plate 3 and bed A′ are coinciding holes 10 10, through which a tool may pass, if necessary. In the ram F is formed a groove or recess to receive a tool, 11, set-screws being employed to hold the same in place. There may be several plates, 3, differing only in the arrangement of the cross-ribs 5, between which the tools of various kinds are clamped and held.

I do not wish to limit myself to the exact construction herein shown, as this may be varied to some extent without materially departing from my invention. For example, a weight may be substituted for the spring L to counterbalance the ram F, and a spring may be substituted for the weight *p* as a means of retracting slide K. The shaft N might also be stopped against endwise movement and be allowed to play through wheel *n* as the ram plays up and down. I have shown the ram as arranged to move up and down in a vertical plane; but it might be arranged to move in an inclined or even horizontal plane.

In Fig. 7, which is a plan view of the ram, (similar to Fig. 3,) I have illustrated a modification of the device for compelling the ram to partake of the upward movement of the coupling-slide I. In this construction I substitute for the rotatively-mounted plate J a slide, J′, mounted in dovetail or undercut keepers j^4 in the top of the ram F, and provided with an operating-handle, j^2. When the slide J′ is pushed in, as seen in Fig. 7, shoulders j^5 j^5 thereon take over the top of the slide I, and when slide J′ is drawn back the slide I is left free to play through an opening, j^3, in said slide J′.

I am aware that it is not new to provide a means for disconnecting a ram from its reciprocating mechanism, and that means have been employed for moving a tool up and down in the ram while the latter is in motion. These constructions I do not claim.

Having thus described my invention, I claim—

1. The combination, with the ram mounted in guides, of the coupling-slide mounted in said ram, means for imparting a reciprocating movement to said coupling-slide, and the plate J, mounted rotatively on the ram and provided with an aperture, j^3, of oblong form, as set forth, whereby said slide may be disengaged from the ram.

2. The combination, with the ram mounted in guides, of the coupling-slide mounted in guides in said ram, means for imparting a reciprocating motion to said slide, and means for compelling the ram to partake of the upward movement of the said slide, as set forth.

3. The combination, with the ram mounted in guides, of the coupling-slide mounted in guides in said ram, means for imparting a reciprocating movement to said slide, means for compelling the ram to partake of the upward movement of said slide, and means for counterbalancing said ram and its attachments, substantially as set forth.

4. The combination of the ram F, mounted in guides, the coupling-slide I, mounted in guides in the said ram, the crank and connecting-rod, the plate J, constructed and mounted on the ram, as shown, and the spring L, arranged to counterbalance the said ram and its attachments, substantially as set forth.

5. The combination, with the ram mounted in guides, of the coupling-slide mounted in said ram, means for imparting a reciprocating movement to said slide, means for counterbalancing said ram and its attachments, the transverse slide K, mounted in and carried by said ram and provided with an inclined face, and means for imparting an in-and-out movement to said slide K, substantially as set forth.

6. The combination, with the ram and the slide K mounted therein, of the mechanism for imparting an in-and-out movement to said slide, comprising the pinion *m*, provided with an arm, *m*′, carrying a stud or bowl engaging a cross-groove, *k*′, in said slide K, the wheel *n*, in mesh with pinion *m*, and the shaft bearing said wheel *n*, all arranged substantially as set forth.

7. The mechanism for imparting rotation to shaft N, comprising the bevel-pinion *n*′ on said shaft, the bevel-wheel n^2, in mesh with said pinion, the treadle O, and the weighted arm P, said treadle and arm attached to said wheel n^2, in combination with said shaft N, substantially as set forth.

8. The combination, with the ram mounted in guides, of the coupling-slide mounted in said ram, means for imparting a reciprocating movement to said slide, means for compelling the ram to partake of the upward movement of said coupling-slide, the transverse slide K, mounted in and carried by said

ram and provided with an inclined face, and means for imparting an in-and-out movement to said slide K, substantially as set forth.

9. The combination, with the machine-bed provided with keepers 4 4, and having an inclined recess formed in it, of the wedge-like plate 2, mounted in said recess in the bed, and provided with a screw for moving it endwise, the rectangular holder-plate 3, mounted on plate 2 between keepers 4, and provided with cross-ribs 5 5 to embrace the tool, and with four equally-spaced holes to receive securing-screws 9 9, and the said securing-screws, whereby said plate 3 may be secured after having been raised to the proper elevation, and whereby, also, the said plate is adapted to be shifted or turned, as hereinbefore set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ALEXANDER BEAUDRY.

Witnesses:

HENRY CONNETT,

J. D. CAPLINGER.