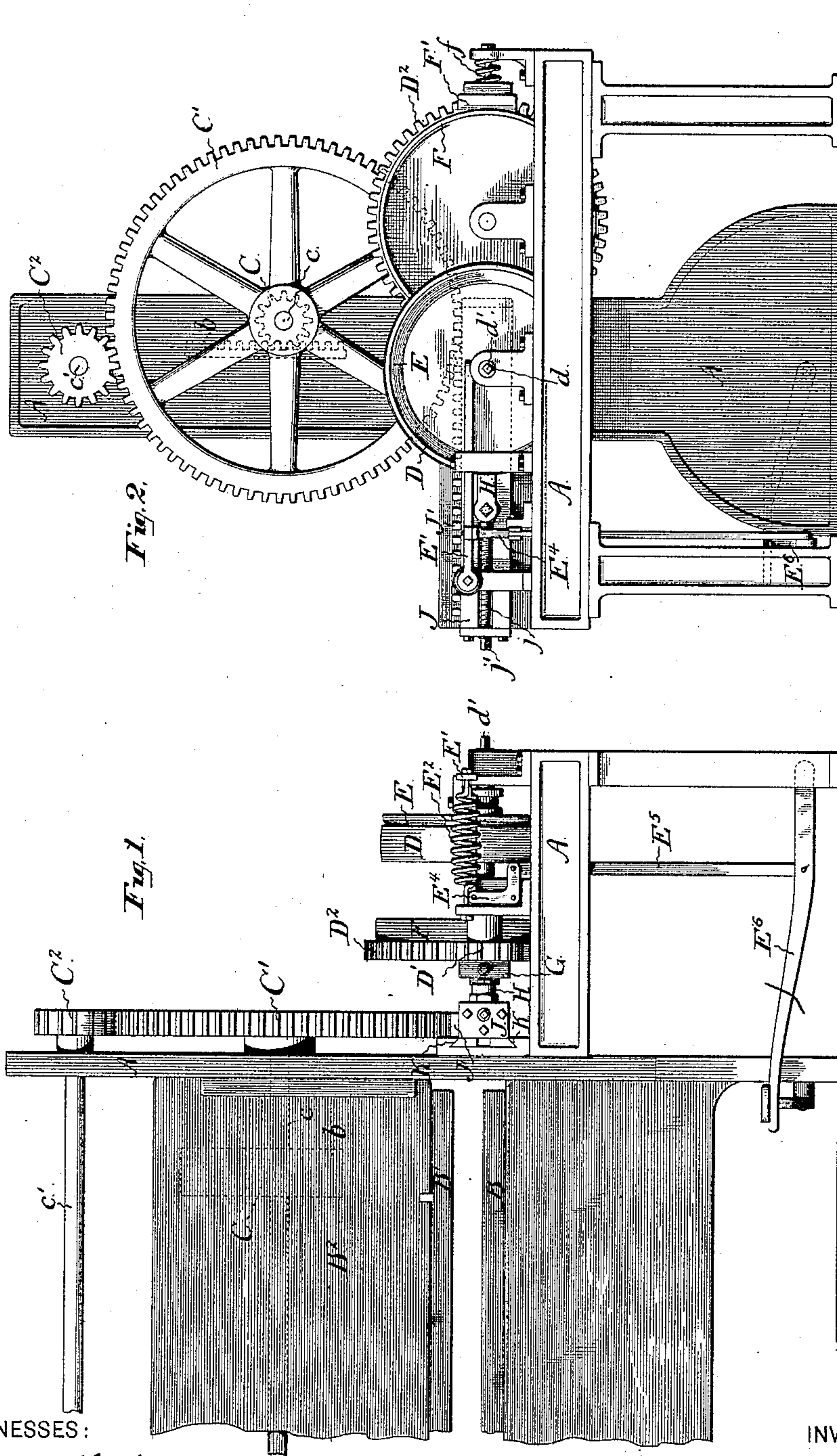


G. A. SMITH.

MACHINE FOR BENDING AND STAMPING METAL.

No. 390,264.

Patented Oct. 2, 1888.



WITNESSES:

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MACHINE FOR BENDING AND STAMPING METAL.

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To all whom it may concern:

Be it known that I, GEORGE A. SMITH, of Norristown, county of Montgomery, State of Pennsylvania, have invented a new and useful
5 Improvement in Machines for Bending and Stamping Metal, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part of this specification.

10 My invention relates especially to machinery such as is used for bending and stamping sheet metal for the manufacture of cornices and like work, though, as will be obvious, it is also well adapted for machines for cutting
15 or punching metal.

In the manufacture of cornices, &c., the machinery used for bending and stamping the sheet metal into shape has generally been actuated by hand, owing to the difficulty which
20 has been found to exist in regulating the stroke and pressure of the bending-dies when driven by power and the necessity which frequently arises of reversing the dies to readjust the sheet between them even after it has been
25 clamped or previously bent.

The object of my invention is to provide such machinery with actuating mechanism which will enable power to be applied in driving it, and at the same time enable the operator to control the motions of the dies with
30 even greater nicety than where they are driven by hand.

Reference being now had to the drawings which illustrate my invention, Figure 1 is a
35 front view of one end of a pair of "bending-dies" or "cornice-brakes," as they are called, and of my improved mechanism for actuating the same. Fig. 2 is a side view of the same; Fig. 3, a plan view; Figs. 4 and 5, detailed
40 views of adjustable parts of the mechanism hereinafter to be explained; and Fig. 6, a perspective view of a crank-key to be used in connection with my improved mechanism.

A indicates the frame-work of the machinery; B, the lower or fixed die supported in any convenient way on the frame-work. B' is the moving die, which is secured in a supporting-frame, B², moving in guides b' secured to the frame of the machine. b is a rack secured
50 to the frame B². C C are pinions secured on shaft c and meshing with the rack b. C' is a

gear-wheel secured on the end of the shaft c. In order to insure the correct and positive motion of the die B', the shaft c' is journaled in the frame A above the gear-wheel C'. At
55 one end of this shaft a pinion, C², is secured so as to engage with the wheel C'. At the other end of the shaft a similar pinion, C³, is secured, engaging with the gear-wheel C⁴, also secured upon the shaft c' and of identical size
60 with the gear-wheel C'. By turning the shaft c backward and forward the pinions C, by their engagement with the racks B, raise and lower the frame B² with its attached die B'. These parts of the machine are all of a well-known
65 construction, and, as heretofore used, have usually been actuated by means of a hand-wheel secured upon the shaft c'.

Passing now to those portions of the machine which are new with me, D is a pulley or
70 belt-wheel through which the machinery actuating the brake is driven. This wheel is loosely journaled on the main driving shaft d and its inner surface is formed to engage with a friction-clutch, E, which is so splined to the
75 shaft d as to turn with it, while having some freedom to move laterally thereon. The position of this clutch E is governed by a pivoted lever, E', to which a spring, E², is attached in
80 such a way as to pull the clutch E away from the pulley D. A system of levers and links, E³, E⁴, E⁵, and E⁶, is connected with the lever E' in such a way as to enable the operator to draw the lever in the direction opposite to that
85 of the spring and thus to engage the clutch E with the pulley D. The system shown is a convenient one for bringing the actuating-lever under the control of the operator's foot as he stands before the braking-dies; but it may of course be varied indefinitely. The end d' of
90 the main shaft d is extended slightly beyond the frame of the machine and made of a proper form to fit a key-crank—such as L—or to be engaged by a wrench, so that when desired it can be turned in the direction opposite
95 to that in which the pulley D revolves. D' is a pinion secured to the main shaft d and engaged with the gear-wheel D². On one side of this wheel D² is secured a cylindrical rim, F, against which presses a brake, F', the pressure of which is regulated by an adjustable
100 spring, f, secured on the frame of the machine.

On the other side of the wheel D^2 are secured the bearings G for a screw-shaft, g . (Best seen in Fig. 5.) Preferably these bearings should be in the form of a slotted box, as shown in the drawings. One end, g' , of the screw g projects beyond its bearings, so that it may be engaged by a wrench or key and the screw turned when desired.

On a nut meshing with the screw g and having bearings in the slotted box G is secured a bearing-pin, g^2 , on which again is secured one end of a connecting-rod or pitman, H . The other end of this connecting-rod H is secured on a bearing-pin, j^2 , which is connected with the screw j (see Fig. 4) in the same way in which the pin g^2 is connected with the screw g . This screw j has its bearings in a slotted sliding block, J , which moves in bearings K upon the frame, and is provided on its upper side with a rack, J' , which engages the gear-wheel C' . One end, j' , of the screw j projects beyond its bearings in the block J in such a way that it may be engaged by a wrench or key.

The operation of my improved apparatus is as follows: The pulley-wheel D is connected by means of a belt with the shaft from which the power is derived and runs freely on the shaft d . When it is desired to move the die D' , the operator draws the clutch E into contact with the pulley D . This in the plan shown is done simply by placing his foot upon the end of lever E^b . The shaft d then rotates with the pulley D , and the pinion D' , secured upon said shaft, rotates the gear-wheel D^2 . The movement of this wheel actuates the connecting-rod H , secured upon one side of it, and this connecting-rod in turn causes the block J to reciprocate in its guides K . The rack J' on the top of the block J , engaging with the wheel C' , rotates it first in one and then in the other direction as it moves backward and forward, and through the shaft c and its pinions C and the racks b the die B' is caused to move up and down. The brake F' , being constantly pressed against the rim F , counteracts and overcomes any momentum of the various moving parts, so that when the operator releases the lever which holds the clutch E in contact with the wheel D the die will instantly stop, and is thus under perfect and absolute control. In case the stoppage of the die takes place after it has clamped or bent the metal between itself and the stationary die B , its motion can be reversed and the die made to clear the metal without further bending it by turning the main shaft d backward through its end d' and a key or wrench; or the same result might be accomplished by turning the screw-shaft j through its projecting end j' . This motion of the screw results in moving the block J , in which it is secured, and which, through its rack J' , will turn the gear-wheel C' any other direction, as may be required. The length of the stroke of the die B' is regulated by the position of the crank-pin g^2 with respect to the axis of the wheel D^2 , and this po-

sition may be altered at will by turning the screw-shaft g , having its bearings on one side of the wheel D^2 . The closeness with which the die B' shall approach the die B is regulated for any length of stroke by turning the screw-shaft j , which, as I have already explained, results in moving rack J' , through which and the pitman H the wheels D^2 and C' are connected.

It is of course self-evident that the frictional resistance by which the accumulation of momentum in the moving parts of the apparatus is prevented may be placed at almost any point in the machine with the same result as when applied to the wheel D^2 . It will also be evident that the gearing by means of which the rack J' is made to actuate the moving die may be indefinitely varied, and that instead of a die a cutting or punching tool could be used. Intermediate gearing of any kind can of course be used to connect the various parts of my improved mechanism, which, however, is in its present form both simple and highly efficient.

The use of the braking device for counteracting the momentum of the machinery will be found advantageous with machines which have not or may not require the devices for adjusting and regulating the stroke which I have described, and these devices also may often be usefully employed with machinery which is not provided with the brake.

The screw-shafts g and j are convenient devices for regulating the positions of the bearing-pins g^2 and j^2 ; but of course the adjustment of these pins in their supporting-wheel and sliding block can be effected without their aid, and the pins clamped in place by nuts, cams, or any of the many familiar clamping devices.

I need hardly point out that the pinion D' is not an essential part of my mechanism and that the wheel D^2 can be secured directly to the shaft d , which actuates it, in which case a crank-arm could be used instead of a wheel, as its only essential function is to afford a support for the adjustable pin g^2 .

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In combination with a reciprocating die or its equivalent, mechanism for communicating motion to said die, a brake arranged to act constantly on said mechanism so as to counteract its momentum, and a clutch for connecting and disconnecting said mechanism with a driving-pulley.

2. In mechanism for actuating a reciprocating die, or its equivalent, substantially as specified, the combination of a rotating bearing-pin adjustable to and from the center around which it revolves, mechanism for sustaining and rotating said bearing-pin connected with and driven by the shaft, a reciprocating rack having a bearing-pin attached to it so as to be adjustable longitudinally, a pitman connecting the said bearing-pins, and mechanism driven by the rack for actuating the die.

3. In mechanism for actuating a reciprocating die, or its equivalent, substantially as specified, the combination of a main shaft, a driving-pulley, a clutch for engaging and disengaging said pulley and shaft, a rotating bearing-pin adjustable to and from the center, around which it revolves, mechanism for sustaining and rotating said bearing-pin connected with and driven by the shaft, a reciprocating rack having a bearing-pin attached to it so as to be adjustable longitudinally, a pitman connecting the said bearing-pins, and mechanism driven by the rack for actuating the die.

4. In mechanism for actuating a reciprocating die, or its equivalent, substantially as specified, the combination of a main shaft, a driving-pulley, a clutch for engaging and disengaging said pulley and shaft, a rotating bearing-pin adjustable to and from the center, around which it revolves, mechanism for sustaining and rotating said bearing-pin connected with and driven by the shaft, a reciprocating rack having a bearing-pin attached to it so as to be adjustable longitudinally, a pitman connecting the said bearing-pins, mechanism driven by the rack for actuating the die, and a brake arranged to act constantly on the mechanism driven through the clutch so as to counteract its momentum.

5. In mechanism for actuating a reciprocating die, or its equivalent, substantially as specified, the combination of a main shaft, a driving-pulley, a clutch for connecting and disconnecting said pulley and shaft, a wheel, D^2 , driven by said main shaft, a screw-shaft journaled on wheel D^2 , a bearing-pin secured to said screw-shaft, so as to move to or from the center of the sustaining-wheel as the shaft is revolved, a sliding block, J, having a rack, J' , secured to it, a screw-shaft journaled in said sliding block, a bearing-pin connected with this screw-shaft, so as to move along the sliding block as the screw-shaft is revolved, a pitman connecting the bearing-pins aforesaid, and mechanism driven by the rack for actuating the die.

6. In mechanism for actuating a reciprocating die, or its equivalent, substantially as specified, the combination of a main shaft, a driving-pulley, a clutch for connecting and disconnecting said pulley and shaft, a wheel, D^2 , driven by said main shaft and having an

annular rim, F, on one side thereof, a brake, F^2 , arranged to press on rim F, a screw-shaft journaled on wheel D^2 , a bearing-pin secured to said screw-shaft, so as to move to or from the center of the sustaining-wheel as the shaft is revolved, a sliding block, J, having a rack, J' , secured to it, a screw-shaft journaled in said sliding block, a bearing-pin connected with this screw-shaft, so as to move along the sliding block as the screw-shaft is revolved, a pitman connecting the bearing-pins aforesaid, and mechanism driven by the rack for actuating the die.

7. In mechanism for actuating a reciprocating die, or its equivalent, substantially as specified, the combination of a main shaft having a projecting end, d' , a driving-pulley, a clutch for connecting and disconnecting said pulley and shaft, a wheel, D^2 , driven by said main shaft, a screw-shaft journaled on wheel D^2 , a bearing-pin secured to said screw-shaft, so as to move to or from the center of the sustaining-wheel as the shaft is revolved, a sliding block, J, having a rack, J' , secured to it, a screw-shaft journaled in said sliding block, a bearing-pin connected with this screw-shaft, so as to move along the sliding block as the screw-shaft is revolved, a pitman connecting the bearing-pins aforesaid, and mechanism driven by the rack for actuating the die.

8. In a mechanism for actuating a reciprocating die, or its equivalent, substantially as specified, the combination of the main shaft d , the pulley D, loosely journaled thereon, the clutch E, lever E' , for actuating said clutch, the spring E^2 , for holding the clutch away from pulley D, connecting mechanism whereby the lever E' can be actuated from the front of the machine, the wheel D^2 , driven by shaft d and having a rim, F, on one side, a brake, F' , acting on rim F, a screw-shaft journaled on bearings attached to wheel D^2 , a bearing-pin adjustable along said screw-shaft, a reciprocating block, J, having rack J' , a screw-shaft journaled in said block, a bearing-pin adjustable on said screw-shaft, a pitman connecting said bearing-pins, and mechanism actuated by rack J' , for reciprocating the die.

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Witnesses:

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