

No. 761,225.

PATENTED MAY 31, 1904.

L. M. HAM.
ROTARY SHEARS FOR METAL CUTTING.

APPLICATION FILED MAY 1, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

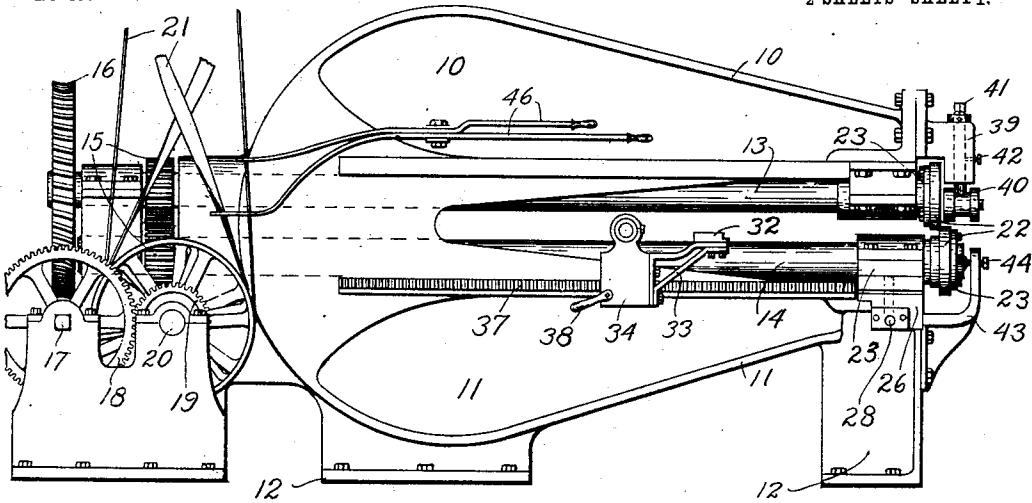


FIG. 1.

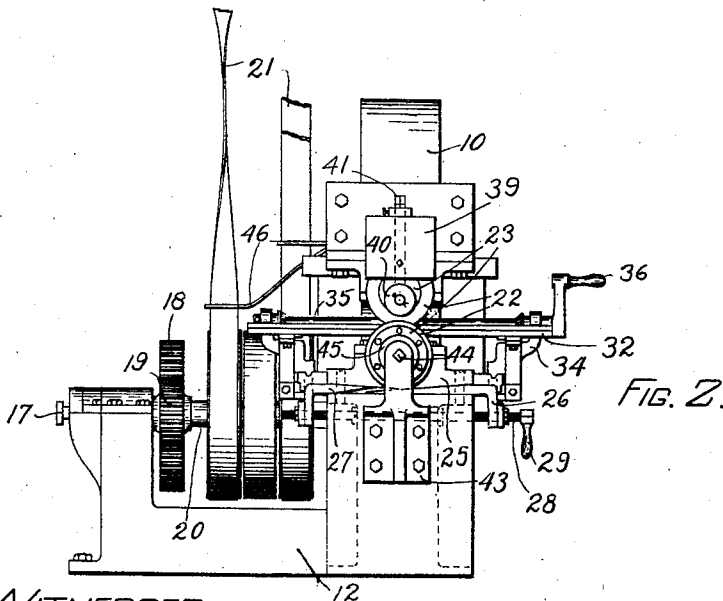


FIG. 2.

WITNESSES

H. W. Lada
C. H. Lammert

INVENTOR

Lamuel M. Ham.
by A. C. Spencer, Atty

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2 SHEETS—SHEET 2.

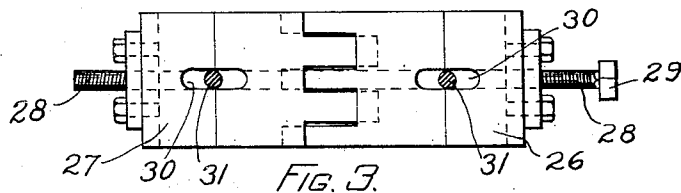


FIG. 3.

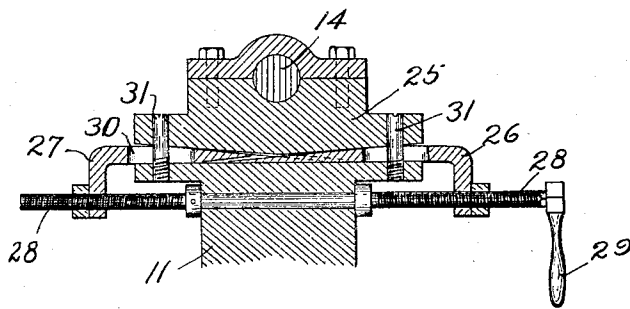


FIG. 4.

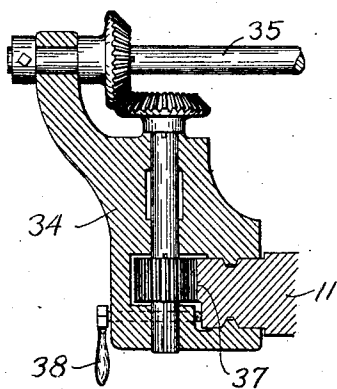


FIG. 5.

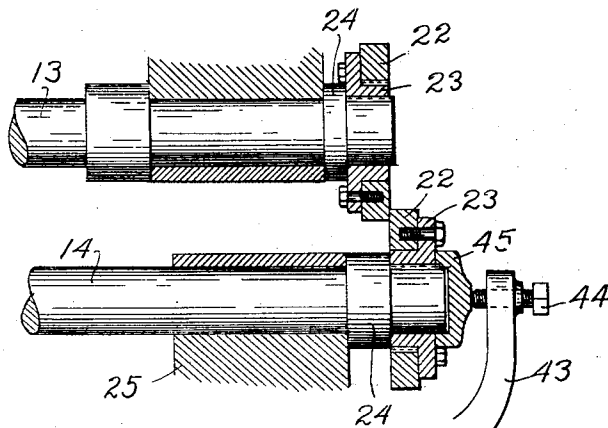


FIG. 6.

WITNESSES

K. M. Ladd
C. H. Gamble

INVENTOR

Lemuel M. Ham,
by R. H. Pierce Atty

UNITED STATES PATENT OFFICE.

LEMUEL M. HAM, OF BOSTON, MASSACHUSETTS.

ROTARY SHEARS FOR METAL-CUTTING.

SPECIFICATION forming part of Letters Patent No. 761,225, dated May 31, 1904.

Application filed May 1, 1902. Serial No. 105,511. (No model.)

To all whom it may concern:

Be it known that I, LEMUEL M. HAM, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Rotary Shears for Metal-Cutting, of which the following is a specification.

This invention is an improvement in various respects upon rotary shears for metal-cutting as heretofore constructed, such improvements adapting the mechanism for a range of work not hitherto possible of accomplishment by rotary cutters. I provide such machines with geared shafts carrying terminal cutters consisting of tempered-steel rings mounted on and bolted to flanged reinforcing-sleeves keyed onto such shafts. I adjust one cutter vertically with relation to the other by peculiar wedges reversely actuated by a right and left hand screw beneath a beveled bearing-block and furnished with a positive guide. I provide between the arms of the machine a movable gage and support for the inner edge of the material being acted on by the cutters and a locking device to secure it in place when adjusted. I locate in front of the upper cutter adjustable rollers, which hold down the front of the plate being cut, so that it shall not be tipped up by the cutting pressure. I furnish an axial stop at the front end of the lower cutter-shaft to prevent its longitudinal movement and the consequent lateral separation of the overlapping faces of the cutters, and I support said rollers and stop in brackets fixed firmly to the end of the respective arms of the machine.

With my improved machine, which weighs several tons, I am able to sever centrally wrought-iron or steel plates ten feet wide and from one-tenth to one-half inch in thickness and thicker still with a larger-sized machine, and when supported and manipulated from the cutting end of the machine I can cut smaller pieces of such material on a curved line, if desired. Mechanical traveling supports on the floor or suspended from above may be provided for presenting large and heavy plates for the action of the machine.

In the drawings, Figure 1 is a side elevation of my machine, and Fig. 2 an end view

thereof. Fig. 3 is a plan of the adjustable wedges, and Fig. 4 a detail vertical section through them and the adjacent parts in the plane of the adjusting-screw. Fig. 5 is a vertical section of the gage-bracket, showing in elevation the gearing and actuating-shaft. Fig. 6 is a detail vertical section through the cutters and connected parts, the shafts being in elevation.

The body of my machine is a heavy casting or forging comprising two integral arms 10 and 11, arranged one above the other, united at the enlarged rear end and tapering gradually both in height and thickness to the front end, their inner faces diverging and the outer faces converging by preference. Said body is formed with or mounted on substantial foundations 12 to secure it firmly in position and is laterally ribbed or flanged to give especial strength and stiffness.

Two parallel cutter-shafts 13 and 14, coupled together at the rear by gear-wheels 15 and suitably driven, extend thence to the front end of the machine. As shown in Fig. 1, power is applied by a worm-gear to the upper shaft, which carries a spirally-toothed wheel 16, engaging the spiral threads formed on a horizontal shaft immediately beneath it, and the gear-wheel 18 on said shaft meshes with a smaller one, 19, on shaft 20, to which power is applied by belt 21. This gives a slow movement. The arrangement may of course be varied. An adjusting-screw 17, Figs. 1 and 2, holds an axial bearing at the end of the screw-shaft to resist the end thrust incident to the engagement of said shaft with the wheel 16.

The rotary cutters 22 consist of heavy tempered-steel rings rectangular in cross-section, each fitting on the tubular portion and bolted to the radial portion of a flanged sleeve or casting 23, which is keyed to shaft 13 or 14, as well as to the ring 22, for which it forms a seat. The parts are supported also on one or both shafts by a radial collar 24, integral with or fixed on the shaft to resist the thrust. The cutting-rings 22 have peripheral faces concentric with the shaft and vertical contact-faces overlapping somewhat and adjusted nicely to each other. They may be removed and sharpened when required, and provision is

made for any slight readjustment incident thereto. The extent to which the cutters separate or overlap varies with the thickness of the material operated on. The means I have devised for effecting the vertical adjustment of the lower cutter according to the thickness of plate to be cut are best shown in Figs. 2, 3, and 4. Between the lower arm 11 and the beveled lower face of the under bearing 25 of shaft 14 I introduce from opposite sides interlocking wedges 26 and 27, which are forced toward and from each other by a long reversely-threaded screw 28, passing through the offset or depending ends of said wedges and engaging nuts formed in or bolted to such ends, so that when such screw is rotated by its crank 29 the wedges will be moved as stated. The screw has no longitudinal movement, collars formed on or fixed to its intermediate portion impinging on the arm 11. (See Fig. 4.) The wedges 26 and 27 are of peculiar construction, as illustrated in Figs. 3 and 4. Their points or entering edges are alternately recessed and reversely tapered, the flat-faced fingers projecting from one wedge entering corresponding inclined recesses in the other. Each wedge has a central longitudinal slot 30 to receive a vertical stud 31, introduced through a perforation in the bearing 25 and at tipscrewed into the lower arm 11. Such slot and pin and the interlocked formation of the wedge-tips constitute effective guides for the wedges in their movement. When the wedges are spread or separated, only their thinned tips are beneath the bearing-block 25, and the shaft 14, carrying the lower cutter, drops slightly, so as to leave a little space vertically between the two cutters, sufficient to admit the thickest plate which the machine will cut. The desired proximity of the cutters will be secured by rotation of the screw 28, the advancing wedges bearing on the beveled under surfaces of block 25 and extending more or less beneath its middle portion, thus raising shaft 14 and causing the cutters to again approach and overlap.

Between the shafts 13 and 14 I arrange a traveling gage for determining or regulating the width of a piece to be cut by the machine. This device consists of a transverse bar 32, Figs. 1 and 2, supported at each end by a double arm 33, extending forward from a bracket 34, which is movable in grooved ways at each side of the lower arm 11. (See Fig. 5.) A transverse shaft 35, with crank 36, is journaled in the brackets and carries beveled gears, which actuate short vertical shafts, each having at foot a gear-wheel engaging the teeth of a long rack 37 at each side of the machine. Rotation of shaft 35 will cause the gage to traverse the space between the arms 10 and 11 and adjust it to the desired position. A set-screw through the brackets beneath the rack with handle 38 secures the gage when adjusted. A rib on the bottom of each bracket

traverses a longitudinal groove in the arm 11 to secure its proper position during movement.

At the front end of the machine I fix firmly to the end of the upper arm 10 a heavy bracket 39 to support adjustable antifriction-rollers 40, which bear against the upper surface of a plate being cut and resist its tendency to rise. These rollers turn freely on a short shaft, which has a grooved vertical stem in a perforation in the bracket. (Shown in dotted lines in Figs. 1 and 2.) A vertical screw 41 engages and adjusts this stem, and a set-screw 42, entering its groove, fixes it in position and prevents its rotation. These adjustable rollers are a great assistance to the workmen, especially in operating on large and heavy plates.

In front of the lower arm 11 a heavy bracket 43, firmly bolted in place, supports a screw-stud 44, which presses a bearing-plate 45 against the outer end of the lower shaft 14 or the flanged casting 23, forming a seat for the cutter on said shaft to resist the outward pressure or endwise thrust due to the strains of use.

The driving-belts run on suitable pulleys and are shifted as required in use by the shipping-levers 46, so that the cutters may rotate in either direction.

I claim as my invention—

1. In rotary shears for metal-cutting, the body having two integral, flanged, tapering arms in the same vertical plane, and two power-actuated shafts mounted in suitable bearings therein and provided with radial collars, in combination with tempered-steel annular cutters and with flanged seats removably secured on said shafts and each formed with a tubular portion fitting between the shaft and cutter-ring and a radial portion to which the cutter-ring is bolted, the tubular portion of such flanged seats being keyed externally to the cutter-ring and internally to the shaft, adjacent to the supporting-collar, substantially as set forth.

2. In rotary shears for metal-cutting, the body formed with two tapering arms, power-actuated parallel shafts suitably mounted, and terminal rotary cutters removably secured on said shafts, in combination with bearings for said shafts adjacent to said cutters and with screw-actuated reversely-movable wedges for adjusting one of said bearings and cutters vertically with relation to the other, substantially as set forth.

3. In rotary shears for metal-cutting, the described means of vertical adjustment of one cutter and its shaft with relation to the other, comprising the beveled bearing-block, the two wedges having interlocking and reversely-tapered points or edges and offset, depending head portions recessed and screw-threaded, and the reversely-threaded screw adapted, by

rotation, to actuate said wedges and withdraw or insert them between said bearing and the body, substantially as set forth.

4. In rotary shears for metal-cutting, the
5 body having integral tapering arms, longitudinal racks along the lower arm, geared shafts suitably mounted and terminal cutters, in combination with an adjustable gage extending transversely of and adapted to traverse the
10 space between said shafts and comprising movable brackets, a transverse bar and shaft connecting them, and gearing on said brackets engaging with said racks and actuated by the crank on said shaft, substantially as set forth.
15 5. In rotary shears for metal-cutting, the body formed with two integral arms having suitable bearings, rotatable shafts mounted therein, and terminal circular cutters fixed on said shafts, in combination with a bracket
20 fixed to the end of the upper arm and anti-friction-rollers mounted in said bracket in

front of the upper cutter and adapted to hold down the front portion of the plate being cut without impeding its movement, substantially as set forth.

6. In rotary shears for metal-cutting, the
25 body formed with two integral arms having suitable bearings, rotatable shafts mounted therein and terminal circular cutters fixed on said shafts, in combination with a bracket
30 fixed to the end of the lower arm, a bearing-plate applied to the cutter-seat 23 on the front end of the lower shaft, and a pressure-screw through said bracket and bearing against said
35 plate to resist end thrust of the lower shaft, substantially as set forth.

In testimony whereof I have affixed my signature in presence of two witnesses.

LEMUEL M. HAM.

Witnesses:

A. H. SPENCER,
JOHN WILSON.