No. 733,427. PATENTED JULY 14, 1903.

W. ROSS.

CUTTING MACHINE.

APPLICATION FILED SEPT. 29, 1902.

NO MODEL.

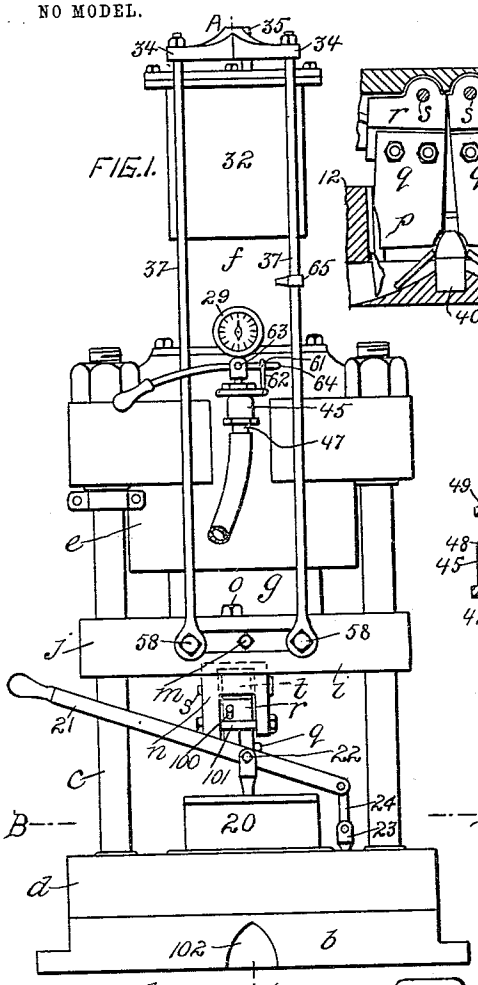


FIG. 1.

FIG. 7.

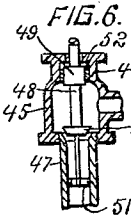


FIG. 6.

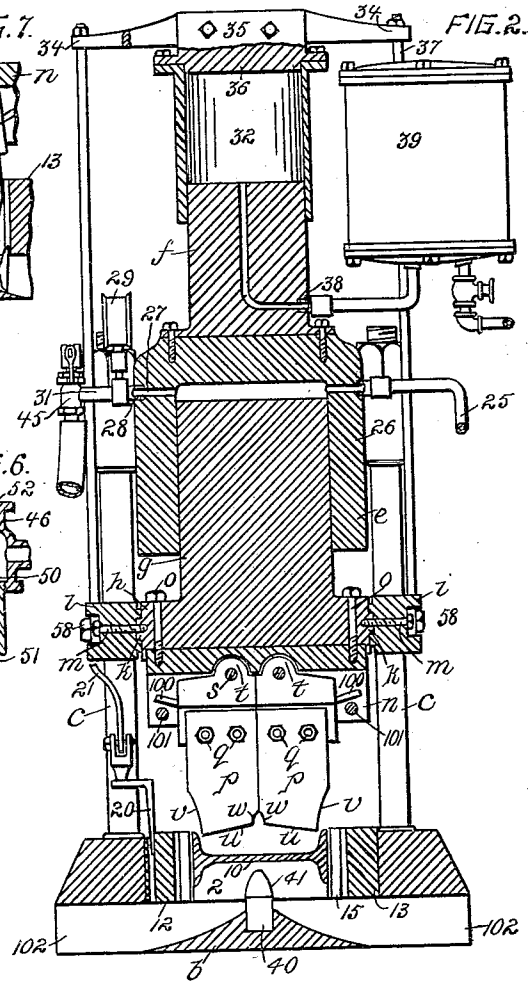


FIG. 2.

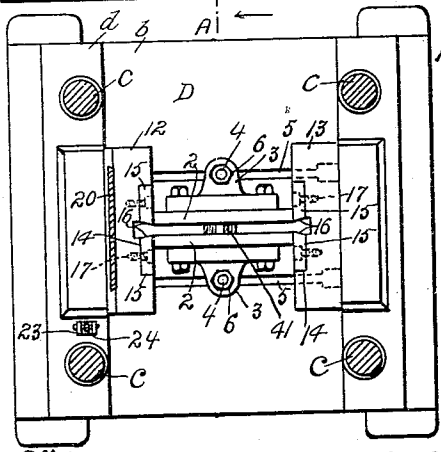


FIG. 3.

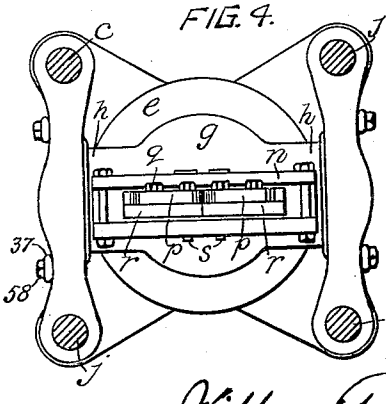


FIG. 4.

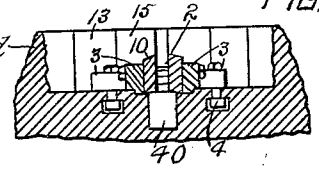


FIG. 5.

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No. 733,427. Patented July 14, 1903.

UNITED STATES PATENT OFFICE.

WILLIAM ROSS, OF MONTREAL, CANADA.

CUTTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 733,427, dated July 14, 1903.

Application filed September 29, 1902. Serial No. 125,259. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM ROSS, superintendent, of the city of Montreal, district of Montreal, Province of Quebec, Canada, have invented certain new and useful Improvements in Cutting-Machines; and I do hereby declare that the following is a full, clear, and exact description of the same.

This invention relates particularly to machines for cutting heavy ware, such as I-beams, channel-irons, and other angle-irons or the like; and it has for its object to cut heavy ware such as just mentioned more quickly than has been possible heretofore and provide a simple and inexpensive machine to this end.

My invention may be said, briefly, to consist of a metal-working machine comprising a stationary female member, a divided male member movable into and out of said female member, the parts of said male member being normally in contact with one another and separable from one another, and a stationary separating member within said female member in the plane of the line of contact of the parts of said movable member with one another; and the invention further consists of hydraulic means particularly adapted to and forming an essential part of said machine, said hydraulic means consisting of an abutment member, a movable member adjacent to said abutment member, and means inclosing the space between said movable and abutment members, a permanent pneumatic body, a constantly-open communicating duct between said body and said space, a second abutment member, a second movable member adjacent to said second abutment member and carrying said divided male member, means inclosing the space between the last-mentioned movable and abutment members, a liquid constantly flowing under pressure through the said last-mentioned space while the machine is at rest, means for arresting the flow of said liquid from and accumulating the pressure thereof in said space, thereby moving said second movable member from its abutment member and toward said female member, means for releasing said liquid from said space upon the completion of the movement of said movable member, and means connecting said movable members together to move in unison.

For full comprehension, however, of my invention reference must be had to the accompanying drawings, forming a part of this specification, in which like symbols indicate like parts, and wherein—

Figure 1 is a side elevation of a cutting-machine constructed according to my invention. Fig. 2 is a longitudinal vertical sectional view taken on line A A, Fig. 1. Fig. 3 is a transverse sectional view taken on line B B, Fig. 1, looking down. Fig. 4 is a similar view to Fig. 3 and looking up. Fig. 5 is a detail transverse vertical sectional view of the base, taken at right angles to Fig. 2. Fig. 6 is a detail sectional view of the valve for controlling the hydraulic pressure, and Fig. 7 is a detail view illustrating the blades in their positions at the completion of a cutting operation.

The base-frame *b* is of trough form and has four standards *c*, constituting cross-head guides, extending upwardly from the sides *d* of said frame and supporting at their upper ends a cylinder *e*, with open lower end and having a stationary cylindrical piston *f* integral with the closed upper end thereof. A cylindrical piston *g* fits into the cylinder *e*, and the lower end thereof has a pair of lateral extensions *h*, having bars *i*, with perforated ends *j*, secured thereto and held against displacement thereon by means of grooves in said bars, and tongues *k* at the ends of the extensions fitting into said grooves, while screw-bolts *m* are threaded through said bars into said extensions. The lower end of this piston, together with the extension *h* and bars *i*, constitutes a cross-head, which has a transverse socket receiving a knife-supporting frame *n* of trough form, secured in place by bolts *o*, projecting downwardly through borings in the extensions and threaded into tapped borings in said knife-frame. The knife carried by this frame consists of a pair of blades *p*, which are bolted, as at *q*, or otherwise removably secured to a pair of plates *r*, pivoted to the sides of the frame by pins *s*, slipped into registering borings in said sides of the frame and in the plates, each plate being formed with a lug *t*, through which said

pins pass, and the interior of the top of the frame having recesses to accommodate said lugs. These blades are of the same shape and each has an inclined lower cutting edge *u* and a concave vertical cutting edge *v*, while the other vertical edge has a concave bearing portion *w*. The edges *w* are arranged adjacent to one another. Stationary shearing devices coacting with said blades are carried by the base-frame and consist of a pair of vertically-arranged plates 2, resting upon the base-plate and bolted to a pair of angular brackets 3, connected to said base-plate by bolts 4, having their heads in T-grooves 5 in the base and projecting through holes in the horizontal portions of said angular brackets, while retaining-nuts 6 are threaded upon the ends thereof and with the bolts secure said bracket and shearing-plates rigidly to the base. The top or shearing edges 10 of these plates conform to the contour of the part to be cut. In the present embodiment of my invention it conforms to the contour of one-half of an I-beam.

A pair of blocks 12 and 13 are located one at each side of the trough-frame and between the ends of the shearing-plates, just described, and the sides of said frame. Each of these blocks is recessed and formed with a shallow slot 14, and a pair of shearing-plates 15, with vertical shearing-edges 16, are secured by screws 17 a short distance apart in the recess, with their shearing-edges a short distance apart. The block 13 is held rigidly in place by the shearing-plates 2, and the block 12 rests loosely in place, and after the I-beam or other thing to be cut is inserted in the trough the block 12 is caused to rigidly clamp it and hold it against accidental displacement by a wedge 20, forced between said block 12 and the adjacent side of the trough-frame by means of a lever 21, to which it is pivotally connected, as at 22, and which is fulcrumed to a standard 23 through the medium of a link 24.

The blades *p* are caused to move laterally when nearing the end of their downward movement by a cylindrical wedge-bar 40, set rigidly in the center of the base and having its upper end projecting above said base and in the form of a wedge 41.

The cross-head is lowered under high pressure and preferably hydraulically through the medium of piston *g* by conducting water through a pipe 25, leading from any suitable pump (not shown) to a supply-port 26, communicating with the upper end of the interior of the cylinder. An exhaust-port 27 allows of the exit of the water from the cylinder, whence it flows away through a pipe 28, carrying a pressure-gage 29 and screwed into the tapped outer end of said port 27, while an exhaust-pipe 31, leading from said pipe 28, is controlled by a balanced valve, to be presently described.

The cross-head is raised by preferably pneumatic pressure by means of a cylinder 32, open at its lower end and fitting over and slidable upon the piston *f*. A frame having four arms 34 is bolted to a web 35, cast in one with the cylinder-head 36, a series of rods 37 projecting through and being secured at their upper ends to said arms and having their lower ends secured, as at 58, to the cross-head, while a pipe 38 is taken inwardly through the piston *f* and communicates with the interior of the cylinder 32. The cross-head is caused to be raised by this cylinder 32 by means of pneumatic pressure, and this is effected by connecting the pipe 38 to any available source (not shown) of pneumatic pressure—such as, for instance, a storage-tank 39—wherein a pressure is constantly maintained at a degree in excess of the weight of the cross-head and its carrying and operating parts and the parts carried thereby.

The valve for controlling the exit-port consists of a valve-casing 45, having guiding-sleeves 46 and 47 at its top and bottom, respectively, the latter constituting an exit-port. A valve proper located in this casing consists of a stem 48, having a collar 49 integral therewith and adapted to slide in the guiding-sleeve 46, while a valvular disk 50 (of greater area than that of the under side of the collar 49) upon the lower end of the stem is adapted to be seated upon the flared upper end of sleeve 47 and control the passage therethrough. A packing-washer 52 encircles this collar, and a spider 51 slides in sleeve 47 and coacts with collar 49 in guiding the valve in its movement. This valve is operated by a lever 60, fulcrumed a short distance from one end, as at 61, upon the top of a link 62, pivoted at its lower end to a bracket carried by the valve-casing 45, while the upper end of the valve-stem 48 is pivotally connected, as at 63, to said lever. The projecting end 64 of this lever is adapted to be tripped upon by a dog 65, carried rigidly upon one of the rods 37. If desired, either of the blades *p* may be removed and the operation carried on with the other one, in which case, however, it will be necessary to cut the article in two operations.

Pin 100 on the side edge of each knife-carrying plate *r* serves to restrict the movement of the knife-carrying sections toward one another by bearing upon cross-pins 101, carried in the frame *n*, while a pair of clearance-passages 102 are formed in the base-frame to allow the waste to fall from the machine.

The operation of my improved cutting-machine is as follows: The water flows continuously through the cylinder *e* under normal conditions. The article to be cut is inserted between the stationary cutting-blades at the sides of the base-frame, with the point to be cut over the transverse stationary blades. The wedge 20 is then forced between the block 12 and the adjacent side of the base-frame, thus causing the article to be rigidly held against displacement while being cut. The valve 50 is then closed, in which condi-

tion it is held by the excessive pressure upon disk 50 over that upon the collar 49. Pressure will then be accumulated in the cylinder *e* and the piston *g*, and with it the cross-head and knives *p* carried thereby lowered gradually into the trough-frame and the knives *p* caused to cut the portion of the article in the line of their rectilineal movement by pressing a portion thereof down between the vertical plates or blades 2. The portion thus pressed or punched out is then forced upon the wedge 40, which is borne upon by the concave bearing portions *w* of these blades, thereby causing them to spread apart and press or punch the side portions of the article between the shearing-plates 15. When the operator sees that the article is completely cut, he opens valve 50, thus relieving the pressure in cylinder *e* and allowing the air-pressure in cylinder 32 to raise it and with it the cross-head and the blades *p*. The wedge is then withdrawn and the severed article removed, or if the operator fails to open the valve at the proper time the dog 65 will trip upon the projecting end 64 of the lever and depress it, thus raising the other end thereof and with it the valve, which is thus automatically opened.

It is obvious that, if desired, the cutting devices may be removed and metal-bending devices or other metal-working means substituted therefor without departing from the spirit of my invention.

I do not herein claim, broadly, the hydraulic motor disclosed, as it forms the subject-matter of an application filed by me on the 27th of February, 1903, under Serial No. 145,424, and constituting a divisional part hereof.

What I claim is as follows:

1. In a cutting-machine the combination with a support for the work to be cut, and stationary cutting device carried upon said support, of a cylinder supported in line with said stationary cutting device and having the end thereof adjacent to said cutting device open, a piston within said cylinder, a cutting device carried upon the outer end of said piston and adapted to coact with said stationary cutting device, a supply-port leading into the upper end of said cylinder, an exhaust-port leading therefrom, a stationary piston in line with and carried by the closed end of said cylinder, a cylinder fitting over said stationary piston, a connection between said movable cylinder and the first-mentioned piston, and an expansile support for yieldingly maintaining said movable cylinder away from said stationary cylinder, a water-supply under pressure to said stationary cylinder and an exhaust therefrom, a valve for controlling said exhaust, substantially as described and for the purpose set forth.

2. In a cutting-machine the combination with a support for the work to be cut and stationary cutting means carried by said support, of a cylinder supported in line with said stationary cutting means and having the end thereof adjacent to said cutting means open and its other end closed, a piston slidable within said cylinder, a cross-head secured to and extending transversely of said piston, a series of cross-head guides extending between said work-support and cylinder, a cutting device carried upon said cross-head in line with said stationary cutting means and adapted to coact with the latter, a supply-port leading into the upper end of said cylinder, an exhaust-port leading therefrom, a stationary piston in line with and carried by the closed end of said cylinder, a cylinder fitting over and slidable upon said stationary piston, a supply-pipe leading into said last-mentioned cylinder for conducting an expansile fluid, a rigid connection between said movable cylinder and slidable piston, an exhaust-pipe communicating with said exhaust-port, a pressure-gage carried by and communicating with said exhaust-pipe, and a valve controlling said exhaust-pipe and located outside of said pressure-gage, substantially as described and for the purpose set forth.

3. In a metal-working machine, the combination with a stationary female member, and a divided male member movable into and out of said female member the parts of said male member being normally in contact with one another and separable from one another, of a stationary separating member within said female member in the plane of the line of contact of the parts of said movable member with one another, and means for moving said movable member for the purpose set forth.

4. In a metal-working machine, the combination with a stationary female member, and a divided male member movable into and out of said female member the parts of said male member being normally in contact with one another and separable from one another, of a rigid wedge within said female member in the plane of the line of contact of the parts of said movable member with one another and means for moving said movable member, for the purpose set forth.

5. In a metal-working machine, the combination with a stationary female member comprising a pair of shearing edges parallel to one another and a short distance apart, a pair of abutments extending between said shearing edges one at each end thereof, and a male member movable into and out of said female member, of a pair of blades arranged with a side edge of one in contact with a side edge of the other and having the corners of one end of their contact edges beveled, means for pivoting said blades to said movable male member at points adjacent to their said contact edges, said blades having a shearing edge along each of the free ends thereof and along the side edges thereof opposite to those in contact with one another and a rigid wedge within said female member in the plane of the line of contact of said blades with one another, and means for moving said movable member, for the purpose set forth.

6. In a cutting-machine comprising stationary cutting means and a reciprocal cutting means reciprocating toward and from said stationary cutting means, said stationary cutting means consisting of a retainer for the work to be cut comprising a carrying part of U form, a pair of blocks within said carrying part and located one at each side thereof and having their adjacent faces recessed, said blocks being movable one toward the other a wedge, adapted to be located between one of said blocks and the carrying part, means for moving said wedge to and from said position, a pair of shearing-plates located in each of said recesses and separated from one another, a pair of shearing-plates located a short distance apart and between and at right angles to said first-mentioned shearing-plates, a pair of angular brackets rigidly secured to said last-mentioned shearing-plates, and means for adjustably securing said brackets to the bottom of said carrier and said reciprocal cutting means consisting of a pair of pivotally-carried blades adapted to receive the downward pressure from its carrying part; and an upwardly-projecting stationary wedge carried in said carrying part of U form for dividing said blades from one another when they near the end of their travel.

7. In a metal-working machine the combination with a support for the metal to be worked and stationary metal-working means carried by said support, of a cylinder supported in line with said stationary working means and having the end thereof adjacent to said working means open and its other end closed, a piston slidable within said cylinder, a cross-head secured to and extending transversely of said piston, a series of cross-head guides extending between said work-support and cylinder, a working tool carried upon said cross-head in line with said stationary metal-working means and adapted to coact with the latter, a supply-port leading into the upper end of said cylinder, an exhaust-port leading therefrom, an exhaust-pipe communicating with the said exhaust-port of said first-mentioned cylinder, a valve controlling said exhaust-pipe and means for automatically opening said valve upon the completion of each stroke of said piston for said purpose set forth.

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

WILLIAM ROSS.

Witnesses:
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ARTHUR H. EVANS.