F. SMALLWOOD.

MACHINE FOR BREAKING STEEL INTO SHELL BLANKS.

APPLICATION FILED JAN. 11, 1918.

1,276,278.

Patented Aug. 20, 1918.

6 SHEETS—SHEET 1.

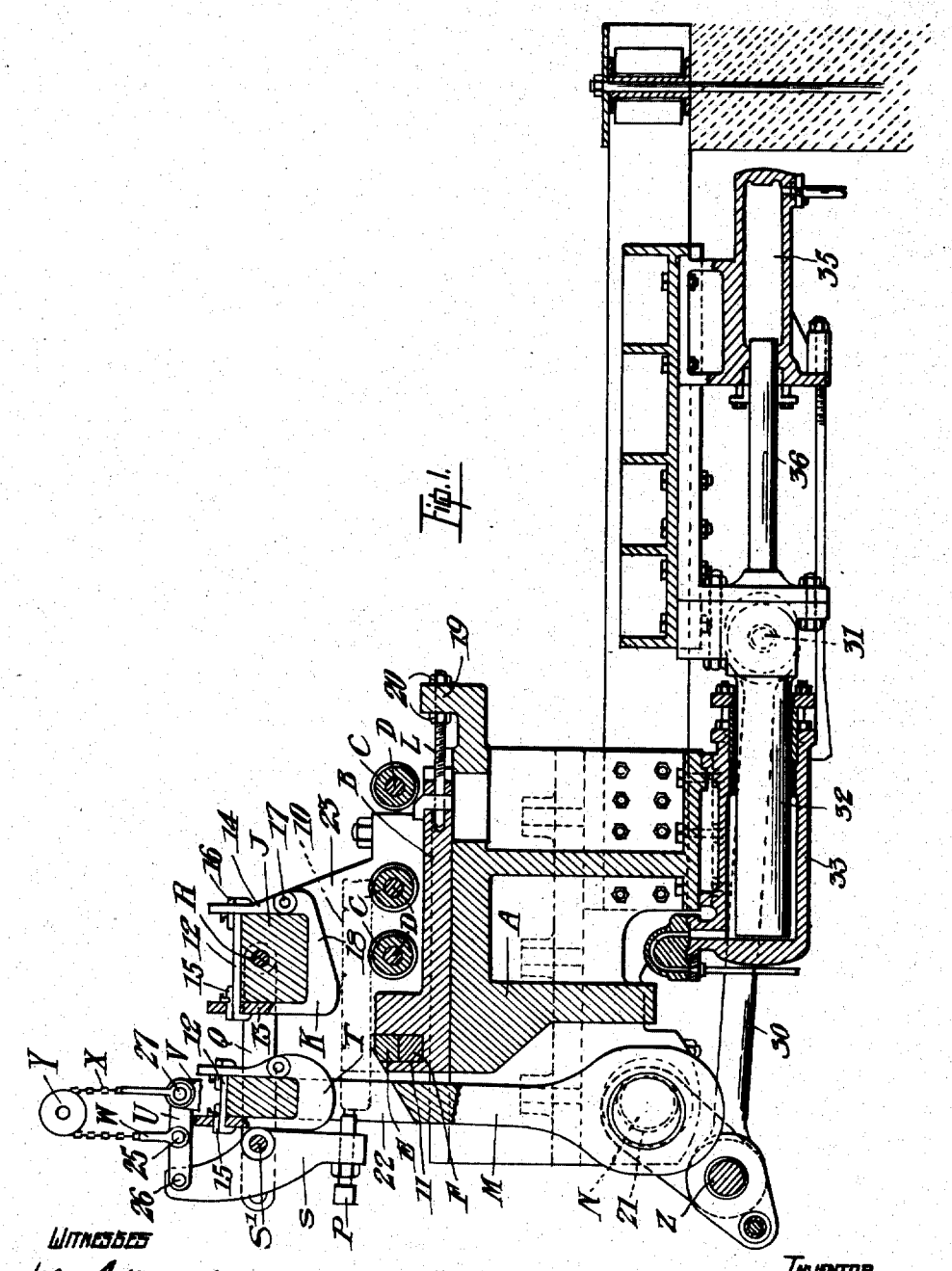

Fig. 1.

WITNESSES

INVENTOR
FRANK SMALLWOOD.

BY Fetherstonhaugh & Co.
ATTYS.

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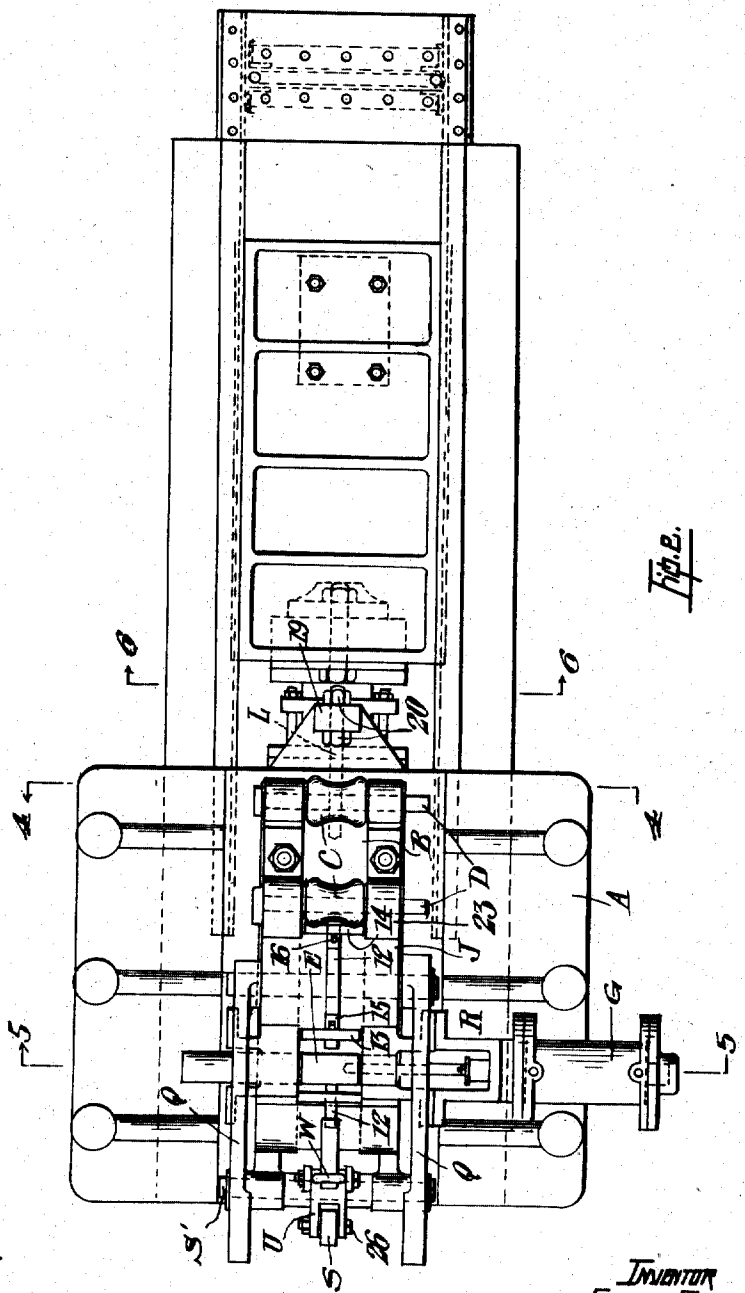

Fig. 2.

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INVENTOR
FRANK SMALLWOOD

BY

Featherstonhaugh & Co.

ATTYS.

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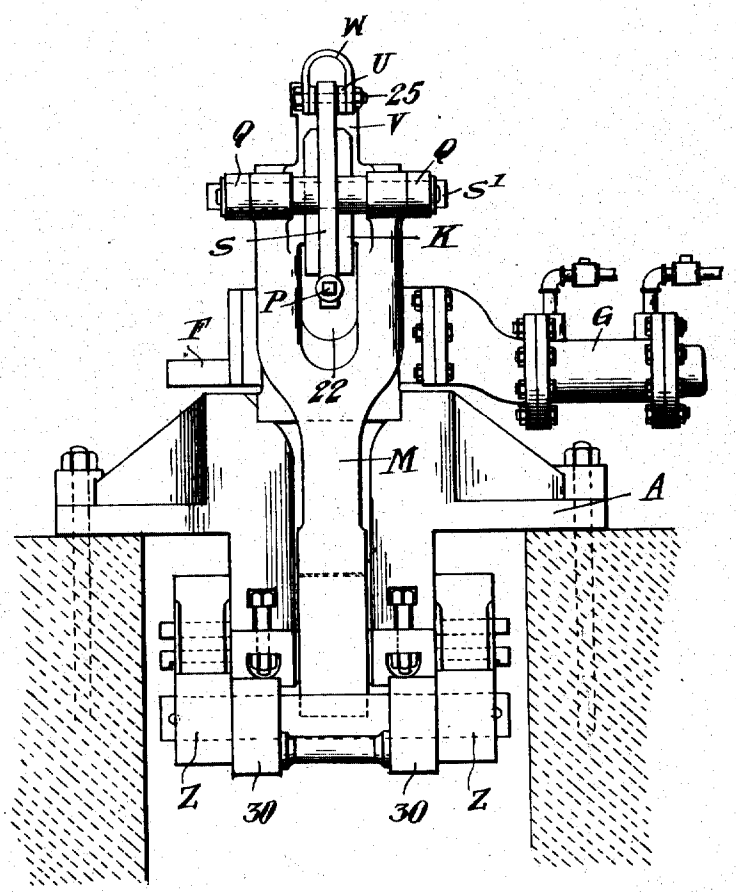

Fig. 3.

WITNESSES

INVENTOR
FRANK SMALLWOOD.

BY Featherstonhaugh & Co.

ATTYS.

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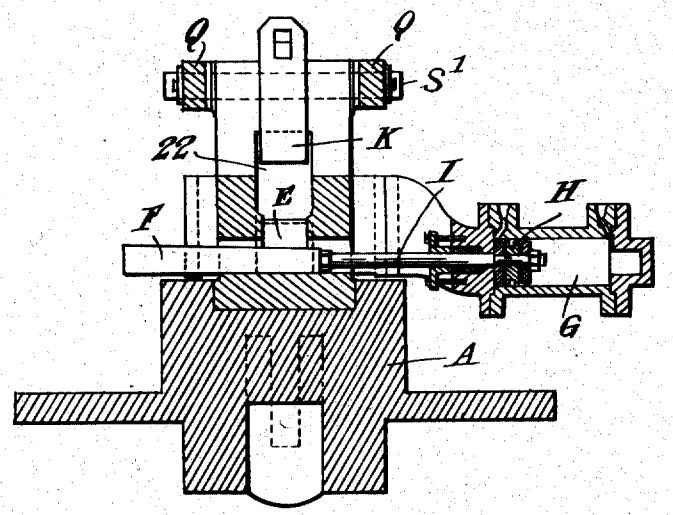

Fig. 5.

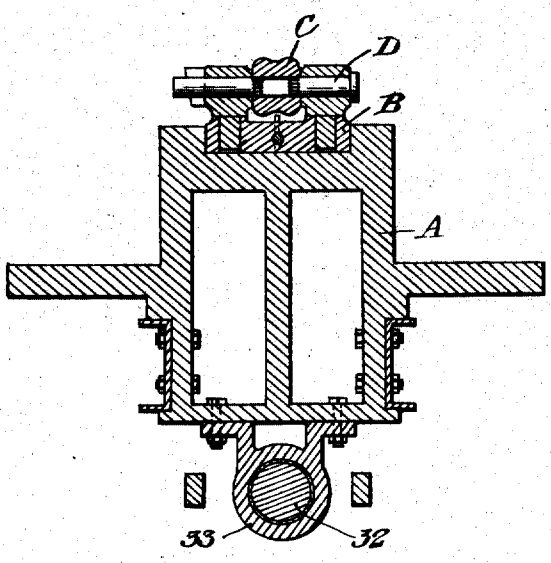

Fig. 4.

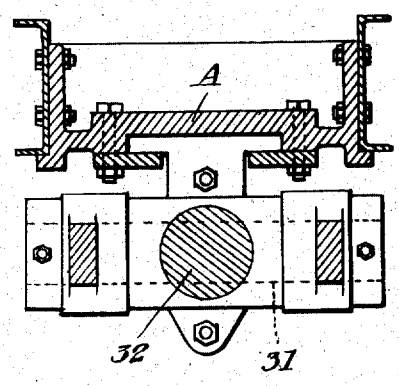

Fig. 6.

WITNESSES

INVENTOR
FRANK SMALLWOOD

BY Featherstonhaugh & Co.
ATTYS.

F. SMALLWOOD.

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6 SHEETS—SHEET 5.

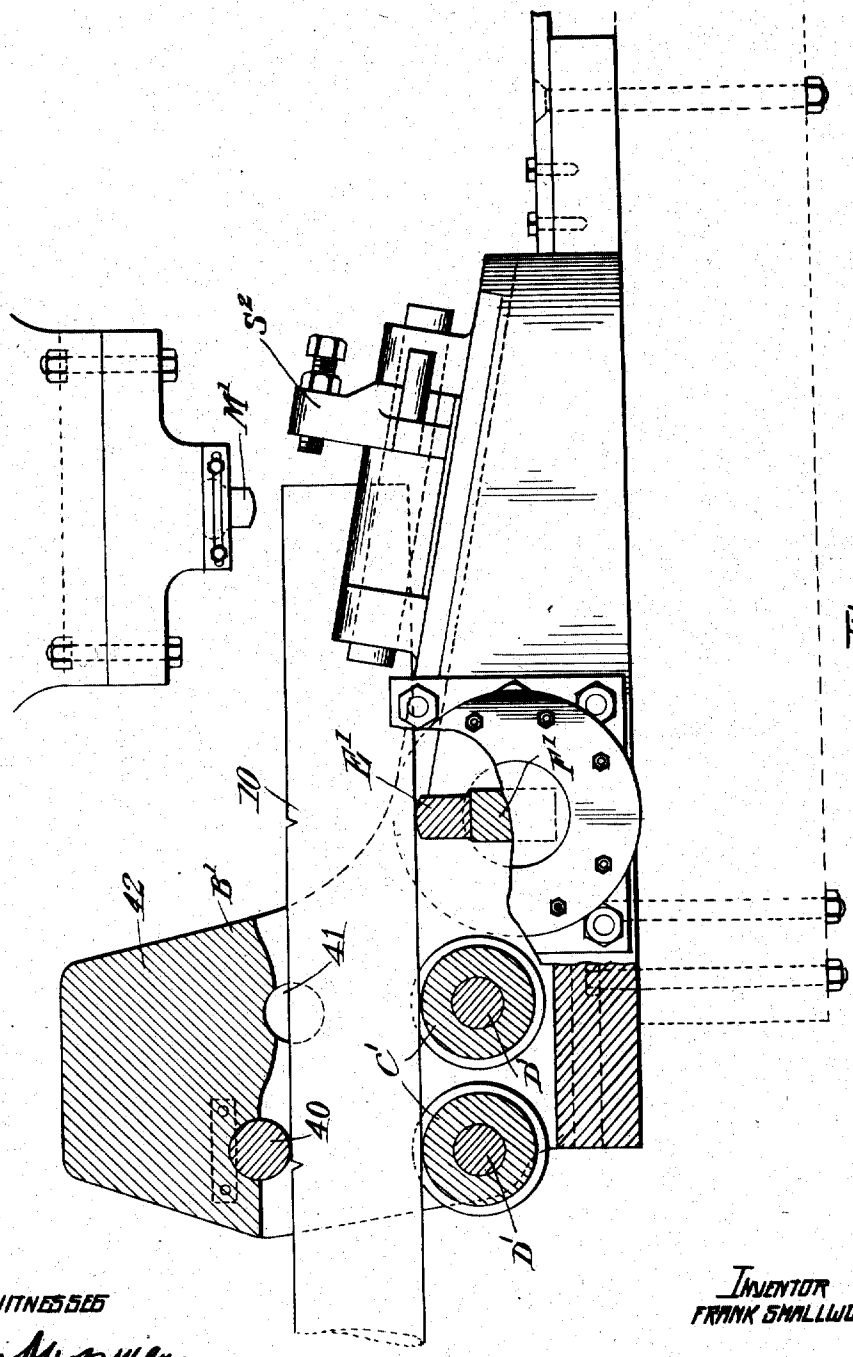

Fig. 7.

WITNESSES

INVENTOR
FRANK SMALLWOOD.

BY Featherstonhaugh & Co.
ATTYS.

F. SMALLWOOD.

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6 SHEETS—SHEET 6.

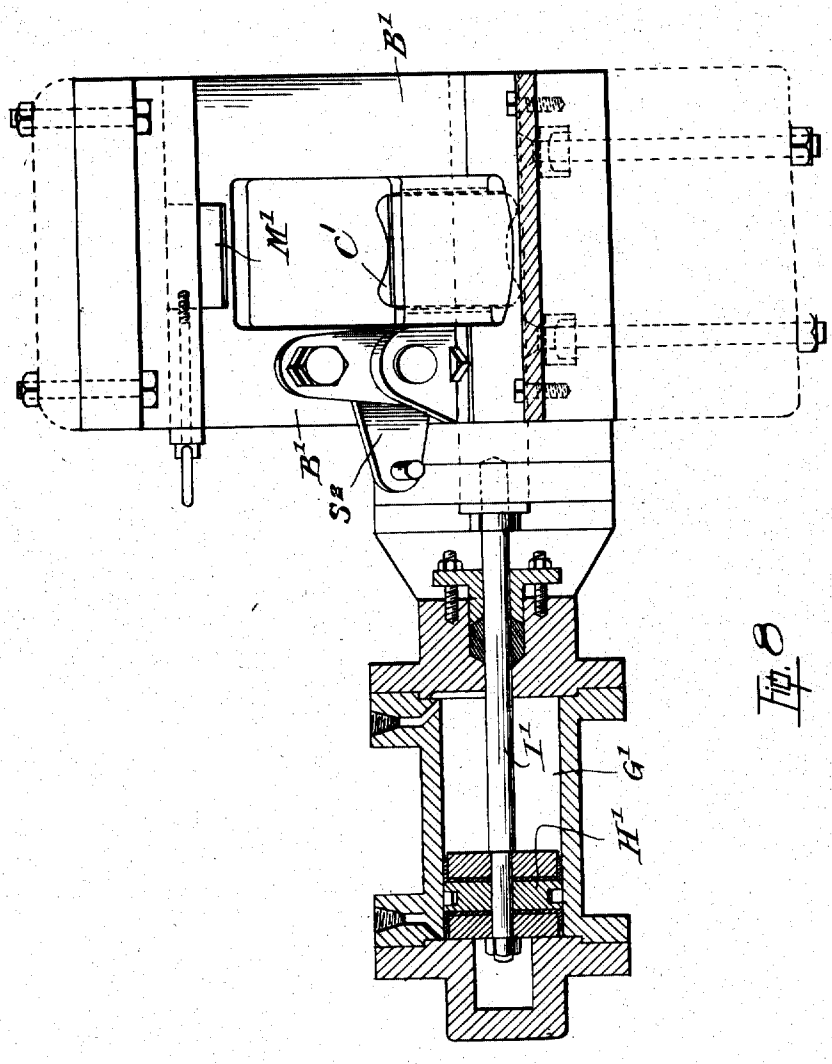

Fig. 8

WITNESSES

INVENTOR
FRANK SMALLWOOD.

BY

Peterson Church & Co
ATTYS.

UNITED STATES PATENT OFFICE.

FRANK SMALLWOOD, OF SAULT STE. MARIE, ONTARIO, CANADA, ASSIGNOR TO ALGOMA STEEL CORPORATION LIMITED, OF SAULT STE. MARIE, ONTARIO, CANADA, A CORPORATION OF ONTARIO.

MACHINE FOR BREAKING STEEL INTO SHELL-BLANKS.

1,276,278. Specification of Letters Patent. **Patented Aug. 20, 1918.**

Application filed January 11, 1918. Serial No. 211,394.

To all whom it may concern:

Be it known that I, FRANK SMALLWOOD, a subject of the King of Great Britain, and residing at Sault Ste. Marie, Province of Ontario, Dominion of Canada, have invented certain new and useful Improvements in Machines for Breaking Steel into Shell-Blanks, of which the following is a specification.

This invention relates to improvements in machines for breaking metallic bars into determinate lengths, as may be desired, in which the bar is broken by pressure being brought to bear, or a blow delivered on (reference being made to points of support) an overhanging or cantalivered portion of the bar, which has been previously nicked at the point where it is desired the break shall occur, by means of a die; or by the removal of metal, as by a cutter; or by so called "burning," effected by means of an oxy-acetylene torch; or by any other suitable method.

The objects of my invention are to effect the desired result expeditiously and economically, by a method in which the operation may be said to be continuous, the bar to be broken being fed in one end of the machine, and the portions broken off automatically delivered at the other end; to provide means of adjustment to suit the various sizes of bars to be broken, and the lengths into which same are to be broken; and to provide means of applying pressure to the overhanging or cantaliver portion of the bar.

The invention consists essentially of the improved construction hereinafter described in detail in the accompanying specification and drawings.

In the drawings:

Figure 1 is a vertical longitudinal section of the entire machine.

Fig. 2 a top view.

Fig. 3 an elevation of the discharging end.

Fig 4 is a section on the line 4—4 of Fig. 2.

Fig. 5 is a section on the line 5—5 of Fig. 2.

Fig. 6 is a section on the line 6—6 of Fig. 2.

Fig. 7 is a sectional elevation of a modified form of the invention.

Fig. 8 is a sectional elevation of the modification shown in Fig. 7.

In the drawings like characters of reference indicate corresponding parts in all the figures.

Referring to the drawings, and first to that form of the invention shown in Figs. 1 to 6, A represents the frame or body of the machine of suitable shape and size to support and house the working parts. B represents the supporting member preferably made in the form of a slide, and carrying supporting rollers C turning on shafts D, which supporting rollers are designed to support the bar 10 of metal or the like which is to be broken.

E represents the anvil member located at one end of the supporting member and preferably provided with means to raise and lower it, whereby it may be raised above the surface of the supporting member, or above the plane of the bottom of the bar.

In the embodiment illustrated, the anvil member E is mounted in a guideway or groove 11, in which it is adapted to be raised or lowered by a wedge member F, which is operatively connected to a pressure cylinder G provided with a piston H, the piston rod I of which is connected to and adapted to operate the wedge member F.

J represents the retaining member adapted to engage and support the side of the bar opposite the anvil member, while the projecting end of the bar is being broken therefrom in the manner hereinafter described. It is provided on the side nearest the anvil member with a removable shoe, filler or wearing piece K, the thickness of which may be varied to suit the diameter or thickness of the bar to be broken. This shoe may be of any convenient construction, as illustrated, it is U-shaped in form and held by the retaining member by means of a link bar 12 extending through slots in the sides 13 and 14 of the shoe and held therein by suitable wedges 15 and 16.

To facilitate the removal of the shoe the side 14 is pivoted at 17 to the bottom section 18. The retaining member J is held by lugs or flanges 23 on the supporting member B, and preferably forms a part of same.

The supporting member B as a whole, is

adapted to be adjusted by suitable nuts 20 on the screw L, which is connected to member B in such a way that it is held from rotating with respect to the same, the opposite end of the screw extending through a lug 19 forming part of the frame.

The nuts 20 also hold member B in adjusted position.

This provides a means to accomplish the adjustment required where it is desired to change the length of the part into which the bar is to be broken.

M represents the breaking member which is designed to be reciprocated substantially vertically and which ordinarily extends approximately vertically. It is supported at its lower end on an eccentric portion 21 of a shaft N, and is guided at its upper extremity by means of links Q connected to the breaking member by a pin S^1 and connected at their opposite extremities to the pin B.

The upper portion of the breaking member M is provided with an eye or opening 22, through or into which may project the end of the bar from which the portion is to be broken. The upper end of the opening is provided with a removable shoe, filler or wearing piece T, while the lower end is formed with a sloping surface to more readily adapt the portion broken from the bar to fall, slide or be removed from the machine.

S, indicates a stop member, designed at the proper time to engage the projecting end of the bar to be broken, and which is mounted for convenience on the pin or shaft S^1, upon which it is free to rotate.

A tappet screw P is provided in the lower end of the stop member S and by which the bar being moved into position for breaking is brought to rest. By adjustment of the screw P, the proper relative position of the nick in the bar to be broken to the point of contact of the bar with the anvil block E can be secured.

The upper end of the stop member S is connected by means of a toggle joint U to upwardly projecting lugs V on the top end of the breaking member M. The toggle joint U is so constructed that falling into a position in which its three joint pins are in line, it is there brought to rest and forms a rigid strut between the lugs V and the upper end of the stop member S, holding the stop member S in proper position for the performance of its function as a stop.

The center pin 25 of the toggle joint U is provided with a shackle W through which is fastened one end of a rope or chain X which passes over a sheave or pulley Y and has its other end fastened to the breaking member M, the rope or chain X being taut or nearly so, when the breaking member M is in its extreme upward position.

The downward movement of the breaking member carrying with it the stop member S and toggle joint U, will through the medium of the rope or chain X cause the center pin on the toggle joint U to assume a position above a straight line drawn between the centers of its two end joint pins 26 and 27, destroying its function as a strut, and causing the lower end of the stop member S to move away from the end of the bar to be broken, thereby providing clearance for the movement of the same during the breaking operation and for the portion broken off when falling out of the machine. The pulley Y, it will be understood, is fixed to any convenient support.

The shaft N is adapted to be actuated by suitable means. I have shown cranks Z on the ends of the shaft N and connecting rods 30 connecting the crank to the cross head 31 on a plunger 32, which latter is reciprocated by means of fluid pressure cylinders 33 and 35. The means for turning or oscillating the shaft N however, are only to be considered illustrative of one of several well known mechanical means which may be employed for the purpose.

The method of operation is substantially as follows: Assuming the breaking member M to be in its extreme upward position and the wedge member F operated to the limit of its travel, in a direction which will allow the anvil member E to fall until its upper surface is below the level of the tops of the rollers C, the toggle joint U will, due to the position of the reciprocating breaking member M, have the centers of its three pins in line and act as a strut, holding the stop member S in proper position to perform the function for which it is intended.

The bar to be broken which has been or will be nicked previous to breaking, is now moved into position against the stop member S, pressure is applied to the piston H so as to operate the wedge member F in a direction which will raise the anvil member E, which in turn raises the piece to be broken, until its upper surface is in contact with the shoe K which will, when pressure is applied to the overhanging or cantaliver portion of the piece to be broken, prevent that portion of the bar which is on the opposite side of the anvil member E from rising.

The bar 10 now being in position for breaking, pressure is applied to the plunger in the cylinder 33, causing it to move, which motion is in turn transmitted through the connecting rods 30 to crank Z, causing the shaft N to rotate, and reciprocating part or breaking member M to move downward and apply pressure to the overhanging or cantaliver portion of the bar to be broken, stressing same to point of rupture, which will necessarily occur at the point of greatest bending moment in the bar, the same being

the point of contact with the anvil member E.

The portion broken from the bar will now fall and slide out of the machine on to the table, floor or receptacle provided to receive the same. During the process of breaking the back end of the bar tends to rise, but is prevented from doing so, due to its being in contact with the shoe K on the retaining member J.

The return movement of the breaking member is effected by means of pressure cylinder 35 operating on plunger 36 connected to the crosshead 31 which transmits the motion in the way previously described.

In the alternative form shown in Figs. 7 and 8 the breaking member and the mechanism for operating the same is dispensed with, the device being, in this form of the invention, designed to be used in combination with a motor driven press, the pressure applying member of which will correspond to the breaking member M.

In this form of the invention B^1 represents the housing, E^1 the anvil member, F^1 the wedge member connected to the piston rod I^1, actuated by the piston H^1 in a cylinder G^1, the supporting member B^1 is of such size and shape that it may be conveniently clamped on the frame. The stop member S^2 is hinged to the side of the housing B^1.

An alternative form of retaining member is shown in the form of pins 40 and 41 which connect the lugs 42 on the supporting member and are adapted to engage the upper surface of the bar being broken. In operation the projecting end of the bar to be broken will be engaged by the breaking member M^1 which is in the form of a contact or tappet member adapted to be secured to the movable plunger of a power press.

As many changes could be made in the above construction, and many apparently widely different embodiments of my invention, within the scope of the claims, constructed without departing from the spirit or scope thereof, it is intended that all matter contained in the above specification and accompanying drawings shall be interpreted as illustrative, and not in a limiting sense.

What I claim as my invention is:

1. In a machine for the purpose specified and in combination, a supporting member, retaining means on the supporting member, an anvil member at the end of the supporting member, means for raising the anvil member above the surface of the supporting member.

2. In a machine for the purpose specified and in combination, a supporting member, retaining means on the supporting member, an anvil member at the end of the supporting member, means for raising the anvil member above the surface of the supporting member and means for adjusting the position of the same.

3. In a machine for the purpose specified and in combination, a supporting member, retaining means on the supporting member, an anvil member at the end of the supporting member, means for raising the anvil member above the surface of the supporting member, said means including a wedge and a fluid pressure cylinder operatively connected to the wedge.

4. In a machine for the purpose specified and in combination, a frame, a slide in the frame, means for adjusting the position of the slide, supporting means on the slide, an anvil member on the slide, means for raising and lowering the anvil member and retaining means above the supporting means.

5. In a machine for the purpose specified and in combination, a frame, a supporting member on the frame, an anvil member on the supporting member, means for raising and lowering the anvil member, a retaining member above the supporting member, a breaking member adapted to exert a pressure on the opposite side of the bar to be broken and against the anvil member, means for actuating the breaking member, and a stop member movable to and from operative position by the breaking member.

6. In a machine for the purpose specified and in combination, a supporting member, an anvil member at the end of the supporting member, and over which the end of the bar to be broken is adapted to project, a reciprocable breaking member adapted to engage the projecting end of the bar, retaining means adapted to engage the unbroken end of the bar during the breaking operation, a pivotally mounted stop member, and means connecting the stop member with the breaking member whereby it is moved to and from operative position.

7. In a machine for the purpose specified and in combination, a supporting member, retaining means on the supporting member, an anvil member at the end of the supporting member, a reciprocable breaking member having an aperture through which the end of the bar to be broken is adapted to project and through which the broken section may fall, and means for actuating the breaking member.

8. In a machine for the purpose specified and in combination, means for supporting a bar to be broken with an end projecting and adapted to be engaged by a breaking member, a reciprocable breaking member having an aperture into which said end is adapted to extend, means for reciprocating and actuating the breaking member, and a movable stop member adapted to engage the end of the breaking member, a toggle device ex-

tending between the stop member and the breaking member adapted in one position to hold the stop member rigid, said toggle device being controlled by the movement of the breaking member.

9. In a machine for the purpose specified and in combination, a reciprocable breaking member, a pivotally mounted stop member, a toggle device connected to the stop device and controlling means on the toggle device operatively connected to the breaking member.

10. In a machine for the purpose specified, in combination, a reciprocable breaking member, a crank having an eccentric operatively connected to one end of the breaking member, means for actuating the shaft, a pair of links connected to the opposite end of the breaking member to that to which the eccentric is connected, a support to which the links are pivoted, and means for supporting the bar to be broken in operative position with respect to the breaking member.

11. In a machine for the purpose specified, in combination, a reciprocable breaking member, a crank having an eccentric operatively connected to one end of the breaking member, means for actuating the shaft, a pair of links connected to the opposite end of the breaking member to that to which the eccentric is connected, a support to which the links are pivoted, and means for supporting the bar to be broken in operative position with respect to the breaking member, a stop member pivotally secured to the links, and controlling means for the stop member extending from the stop member to the breaking member.

12. In a machine for the purpose specified and in combination, a supporting member, a retaining member above the supporting member, a removable facing shoe on the retaining member, an anvil member on the supporting member and means for raising and lowering the anvil member.

13. In a machine for the purpose specified and in combination, a supporting member, a retaining member above the supporting member, a removable facing shoe on the retaining member, an anvil member on the supporting member and means for raising and lowering the anvil member, a breaking member adapted to engage the end of a bar projected beyond the anvil member and a removable facing shoe on the breaking member.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

FRANK SMALLWOOD.

Witnesses:
JAMES HANSOM,
E. R. OSBORN.