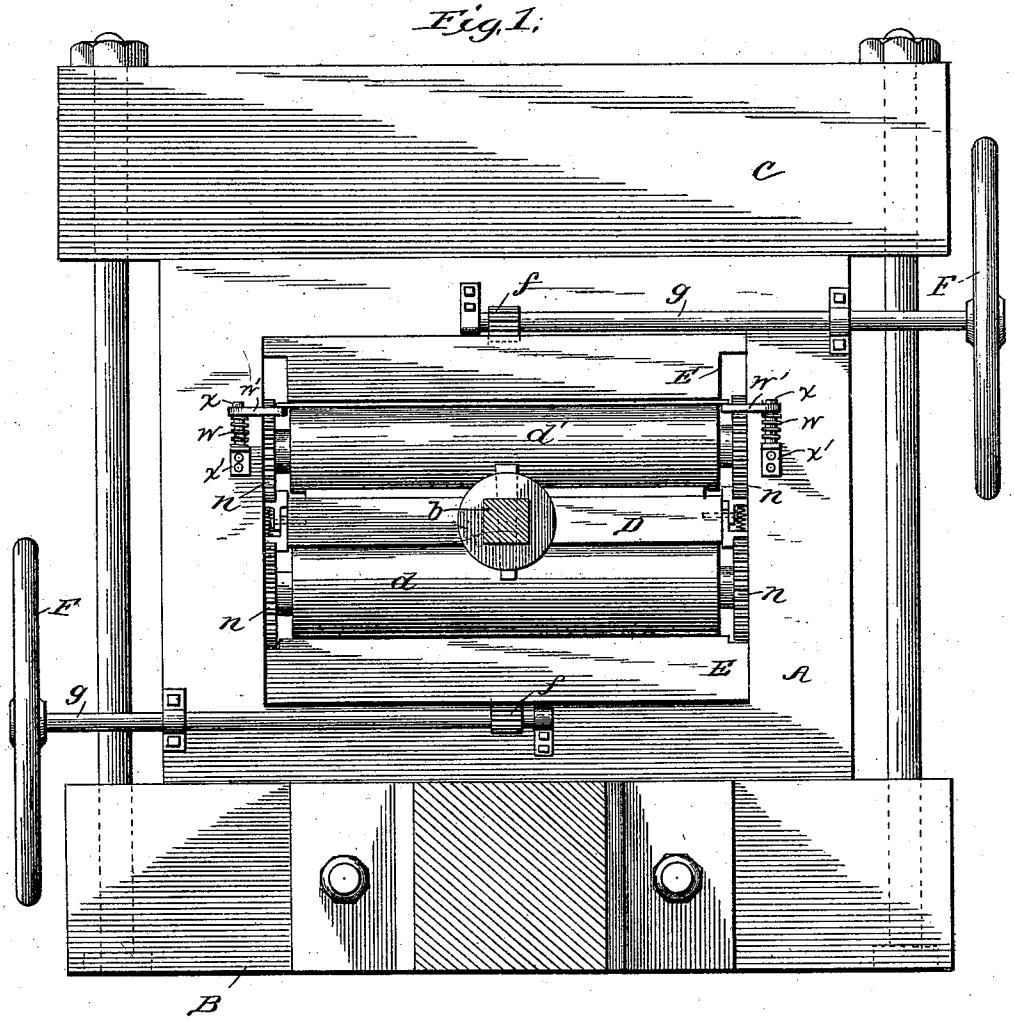
(No Model.) 3 Sheets—Sheet 1.

S. JOHNSTON.

ROLLING MILL.

No. 531,042. Patented Dec. 18, 1894.

Fig. 1.



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By
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Attys.

(No Model.) 3 Sheets—Sheet 2.

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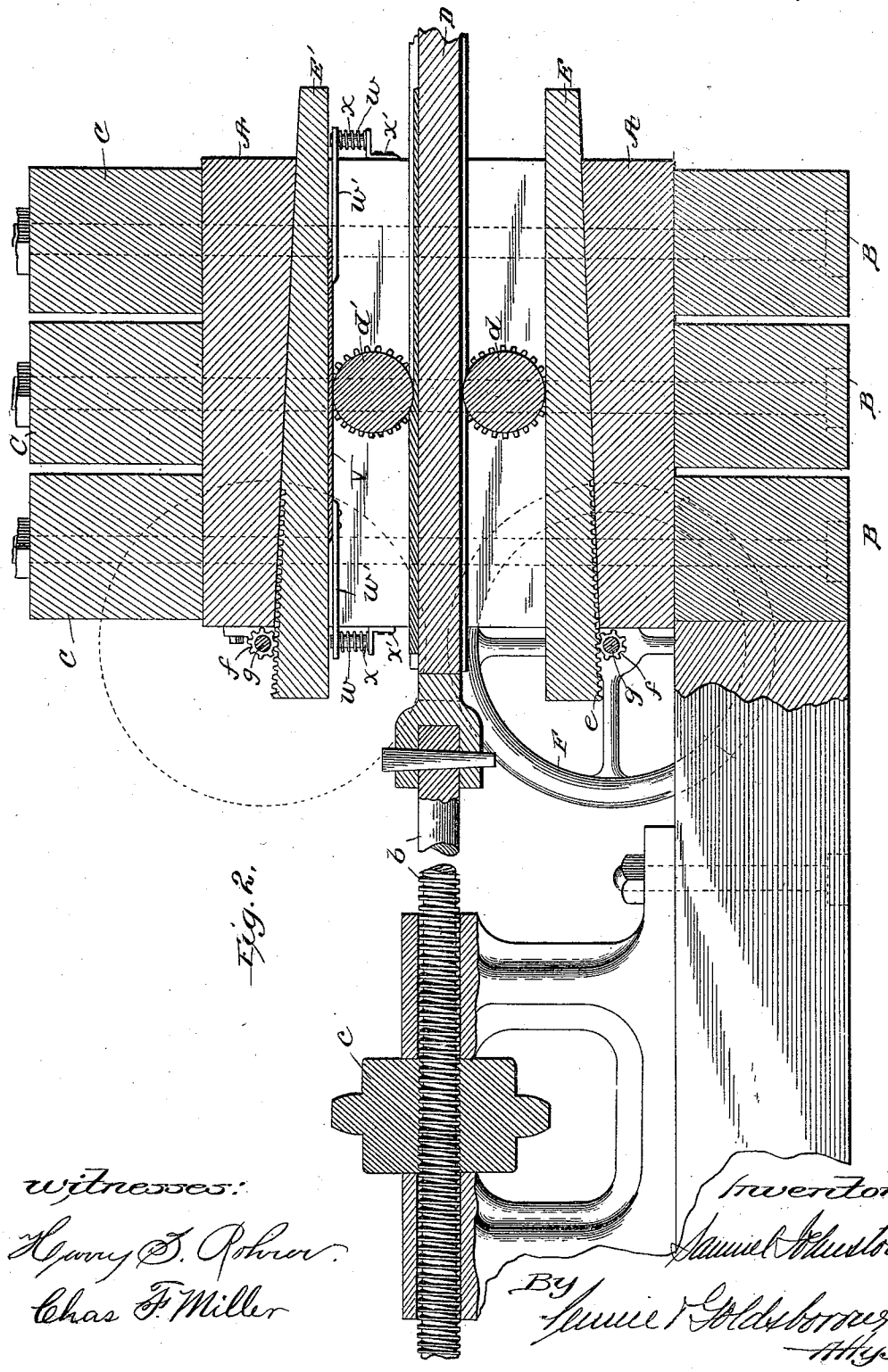

Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

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ROLLING MILL.

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Fig. 3.

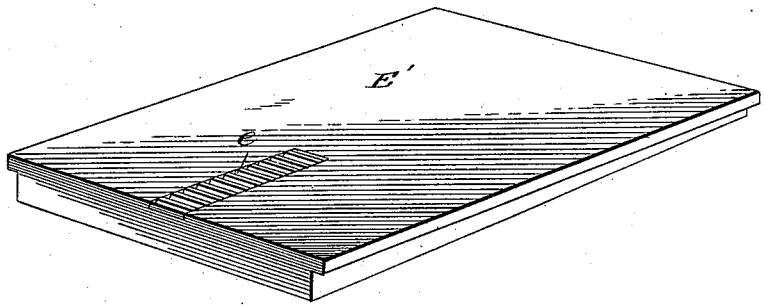


Fig. 4.

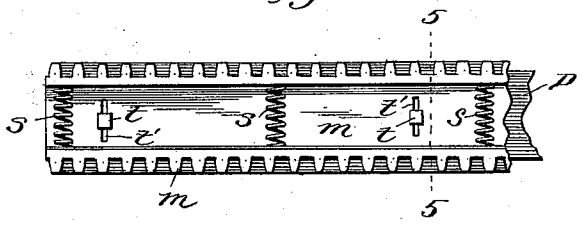


Fig. 5.

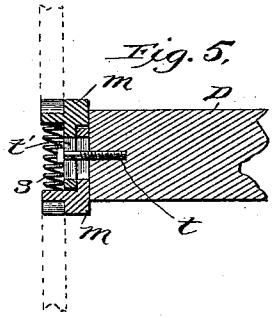
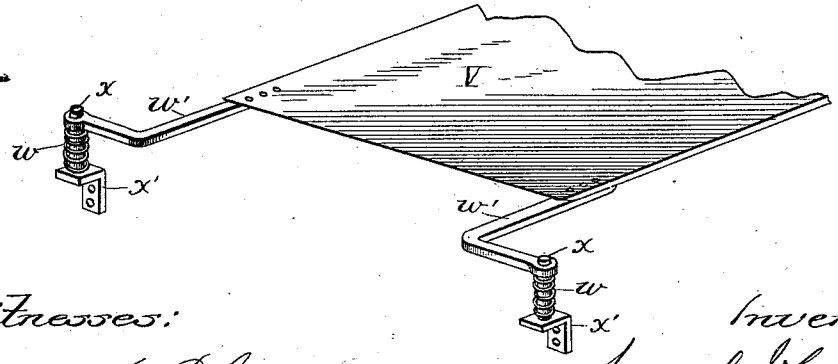


Fig. 6



Witnesses:
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UNITED STATES PATENT OFFICE.

SAMUEL JOHNSTON, OF NEW YORK, N. Y.

ROLLING-MILL.

SPECIFICATION forming part of Letters Patent No. 531,042, dated December 18, 1894.

Application filed December 27, 1893. Serial No. 494,912. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL JOHNSTON, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Rolling-Mills; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to certain new and useful improvements in rolling mills, for reducing, compacting and planishing metallic sheets and the like, and is particularly designed to furnish a construction of extraordinary efficiency in its capacity for reduction, while, at the same time, such as to lessen to a minimum the usual tendency of rolling operations to exert a tearing or drawing strain upon the plate or other work subjected to their action.

In the accompanying drawings, Figure 1 represents a sectional elevation of a rolling mill embodying my invention, the section being taken upon a plane indicated by the line 1—1 of Fig. 2. Fig. 2 represents a central longitudinal section thereof partly in elevation and partly broken away. Fig. 3 represents, in perspective, one of the adjusting plates for varying the width of the pass between the platen and its working roller when the mill is in operation. Fig. 4 represents a side view of a portion of the platen. Fig. 5 represents a section thereof taken on a plane indicated by the line 5—5 of Fig. 4; and Fig. 6 represents in perspective one end of the tempered backing plate of the working roller.

Similar letters of reference indicate similar parts throughout the several views.

Referring to the drawings, it will be noted that the housing within which the platen and its rollers operate is made up of a single metallic casting A, resting upon a series of metallic massive foundation beams B, and supporting a corresponding series of like beams C, said two series of beams being held firmly and rigidly in place by the bolt rods *a*, as shown, so as to lend extraordinary strength and stability to the housing in the plane of its greatest needed resistance.

The platen D of the mill is adapted to be reciprocated by suitable power mechanism, for instance, by means of the worm shaft *b*, and worm gear *c* which latter is provided on its periphery with cog-teeth by means of which it may be revolved from a power shaft, so as to cause the worm shaft to be advanced or retracted according to the direction of the worm gear's motion.

In the preferred form of my invention, the platen rests upon a roller *d* which is free to roll forward and backward upon the wedge-shaped plate E. A similar roller *d'*, located in juxtaposition to the roller *d*, rests upon and is free to move with the platen and has a main backing plate E' corresponding to the plate E. It will be observed that the aperture of the housing within which the platen and the rollers reciprocate is in form the frustum of a prism with upper and lower converging sides corresponding in inclination to the inclined sides of the wedge-shaped adjusting plates E, E', so that by advancing either or both of the said plates, as the case may be, the plane surfaces of the plates are brought nearer together, thereby lessening the effective height of the opening and correspondingly decreasing the height of the working pass between the platen and the roller *d'*, when the mill is in operation. A retraction of one or both of the plates E, E' will, of course, be accompanied by a corresponding increase in the height of the working pass between the platen and its superincumbent roller.

To readily effect the movement of the plates E, E', I provide them upon the inclined surfaces with the depressed rack teeth *e*, adapted to intermesh with a rack pinion *f*, upon a shaft *g*, operated by the hand wheel F.

The rollers *d*, *d'*, are intended preferably to be in juxtaposition to each other as illustrated in Fig. 2, and in order the better to insure their maintenance in this relative position at all times during the reciprocation of the platen, I provide each roller, at its ends, with cog gears *n*, adapted to mesh with racks upon the sides of the platen, so that as the platen reciprocates the rollers are positively progressed with it. In view of the varying height of the working pass, I have arranged these rack bars in such manner as to be constantly in engagement with the gears *n* regardless of the varying distance of the roller *d'* above

the platen. To this end I connect the rack bars m to the sides of the platen by the headed screw pins t which play in the slots t' as shown, and I interpose springs s between the rack bars, which serve at all times to keep the rack bars in engagement with the cogs n of the rollers by permitting the rack bars to have free vertical play corresponding to any variation in the distance between the upper and lower sets of cogs. To protect the back pressure bed of the upper roller d' against the wearing effect of said roller I interpose a wear plate V of tempered plate, supported at its ends upon springs w by arms w' whose perforated ends are adapted to slide upon studs x of the brackets x', as shown. It will be further especially noted that this chilled plate V is of a length less than the path of movement of the roller d', so that when the roller is at the forward or rearward limit of its play, it will release the blank that is being rolled from the reducing pressure and permit it to be fed forward, or removed from the mill, as the case may be.

In operation, the metal plate, blank, or other work to be reduced or planished, is placed upon the platen D when the roller d' is at one end or the other of its path of movement, (for instance the rearward end) and the platen is then advanced. The rollers d d' advance with the platen, and when the edge of the chilled plate is reached, the blank is caught between the roller d' and the platen, and the reducing operation begins, being completed when the roller passes the opposite edge of the chilled plate thereby releasing the blank and permitting its removal. The reducing action of the roller and platen is almost entirely compressive and practically without a drawing effect, or tendency to tear the metal, while the power exerted is very great by reason of the relationship of the sliding platen and revolving roller.

It is evident that the lower side of the platen may in like manner be utilized as the rolling surface in co-operation with the lower roller but it is more convenient to use the upper side for obvious reasons. It is also evident that while it is preferable when using either roller as the working roller, to use a single roller on the other side of the platen, yet a series of rollers on said opposite side of the platen may in some instances be employed.

Having thus described my invention, what I claim is—

1. A rolling mill, provided with a frame, having a lower bed, a roller free to travel upon said bed, a reciprocating platen supported upon said roller, a second roller above the platen in juxtaposition to the first roller, and an upper or back-pressure bed above the second roller; substantially as described.

2. A rolling mill provided with a platen, means for advancing the platen, and rollers co-operating with opposite sides of the platen, said rollers having beds upon which they are free to travel; substantially as described.

3. A rolling mill provided with a platen, means for advancing the platen, and rollers co-operating with opposite sides of the platen, said rollers being in juxtaposition to each other and having their axes in the same vertical plane and having beds upon which they are free to travel; substantially as described.

4. A rolling mill provided with a platen, means for advancing the platen, and rollers co-operating with opposite sides of the platen, said rollers being geared to the platen, and having beds upon which they are free to travel; substantially as described.

5. A rolling mill provided with a platen, means for advancing the platen, and rollers co-operating with opposite sides of the platen, said rollers having beds adjustable toward or from the platen, upon which beds they are free to travel; substantially as described.

6. In a rolling mill, the combination with a platen, of means for advancing the platen, a roller co-operating with the platen to reduce the metal passing between them, and a bed for the roller, the roller being free to travel upon the bed and sufficient space being provided between the platen and bed to permit the formation of a reducing pass between the roller and platen during the advance of the latter; substantially as described.

7. In a rolling mill, the combination with a platen, of means for advancing the platen, a roller co-operating with the platen, a bed for the roller, the roller being free to travel upon the bed, and means for varying the distance between the platen and bed; substantially as described.

8. In a rolling mill, the combination with a platen, of means for advancing the platen, a roller co-operating with the platen, a bed for the roller, the roller being free to travel upon the bed, means for varying the distance between the platen and bed, and a roller bed for the platen; substantially as described.

9. In a rolling mill, the combination with a platen, of means for advancing the platen, a roller co-operating with the platen, a bed for the roller, the roller being free to travel upon the bed, means for varying the distance between the platen and bed, and a roller bed for the platen, said roller bed being free to travel with the platen; substantially as described.

10. In a rolling mill, the combination with a platen, of means for advancing the platen, a roller co-operating with the platen, a bed for the roller, the roller being free to travel upon the bed, a roller bed for the platen, and means for raising or lowering the roller bed; substantially as described.

11. In a rolling mill, the combination with a reciprocating platen, of a roller co-operating therewith, and a bed for the roller, the roller being free to travel over said bed, the bed being provided with a facing plate adjacent to

the roller and of a length less than the travel of the roller so that on leaving said plate the pressure of the roller upon the work is relieved; substantially as described.

12. In a rolling mill, the combination with a reciprocating platen, of a roller co-operating therewith, a bed for the roller, the roller being free to travel over the bed, the bed being made up of wedge-shaped pieces having their inclines adjacent to each other, and an independent facing plate adjacent to the roller; substantially as described.

13. In a rolling mill, the combination with a reciprocating platen, of a roller co-operating therewith, a bed for the roller, the roller being free to travel over the bed, the bed being made up of wedge-shaped pieces having their inclines adjacent to each other and an independent facing plate adjacent to the roller, said facing plate being spring supported; substantially as described.

14. In a rolling mill, the combination with the platen of the rollers co-operating therewith, the platen being provided with racks and the rollers with gears intermeshing therewith and springs for keeping the rack in mesh with the gears; substantially as described.

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

SAMUEL JOHNSTON.

Witnesses:
A. M. PARKINS,
H. M. STERLING.