3 Sheets--Sheet 1.

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Rolling Mills and their Appliances.

No. 152,508. Patented June 30, 1874.

FIG. 1.

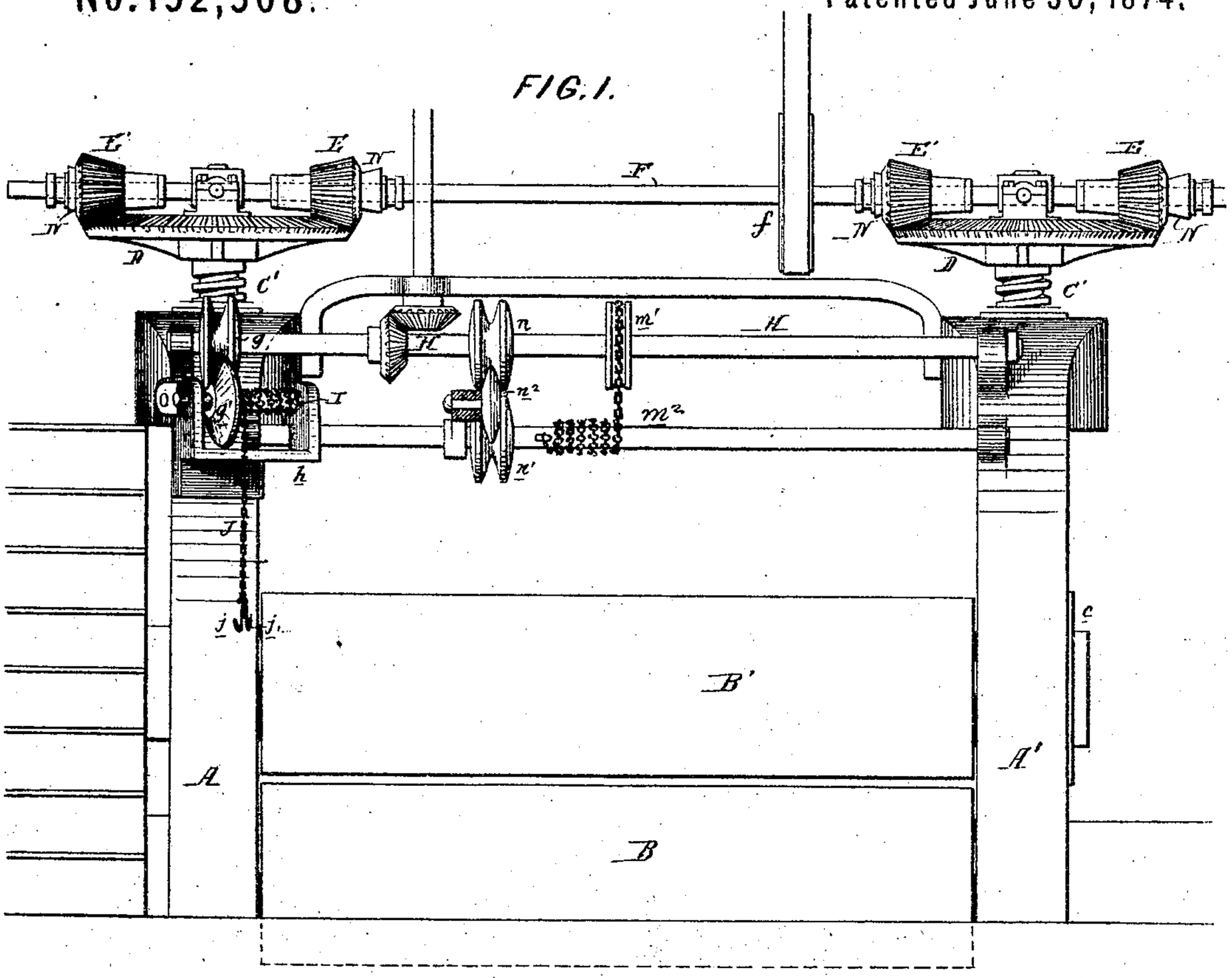

FIG. 2.

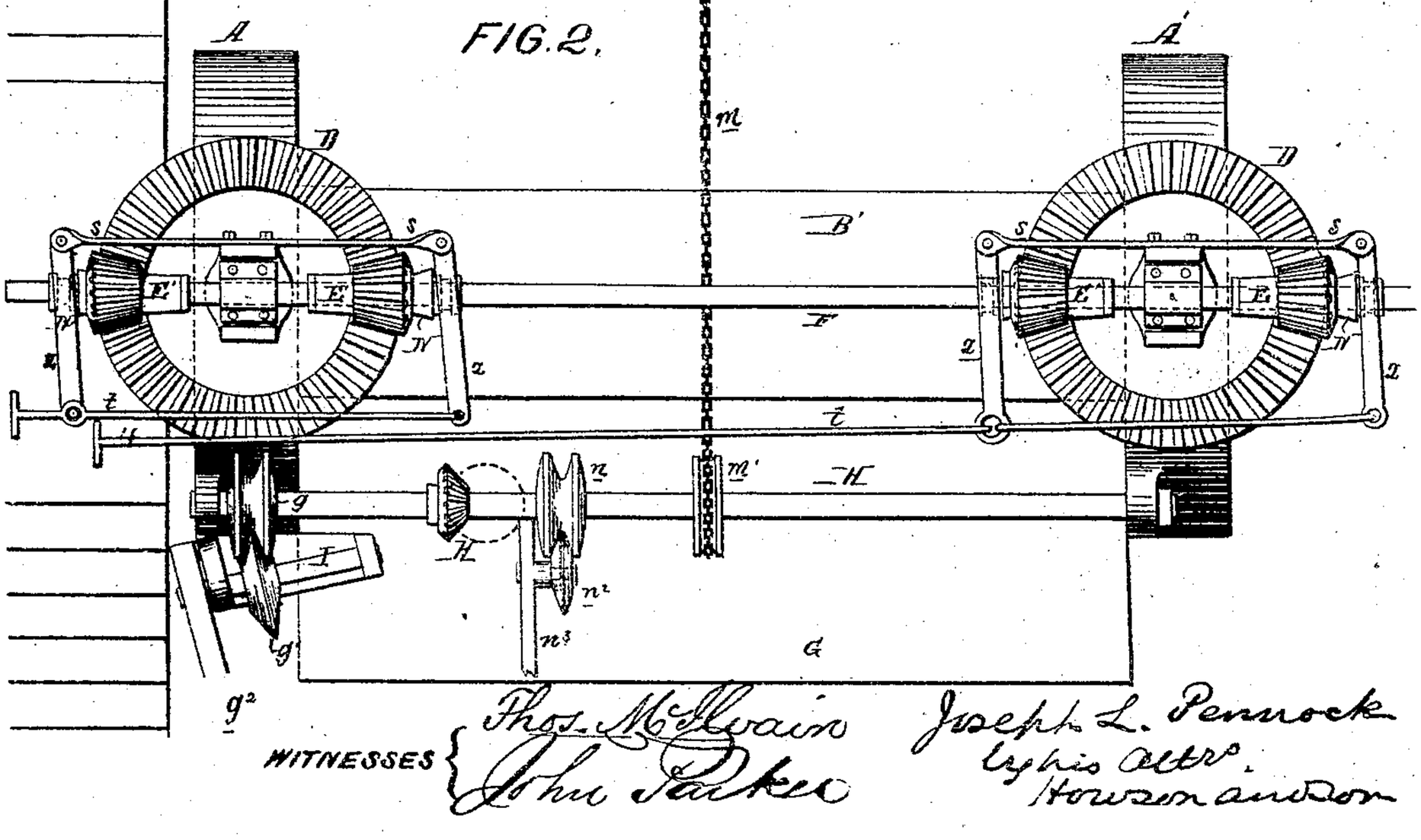

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FIG. 4.

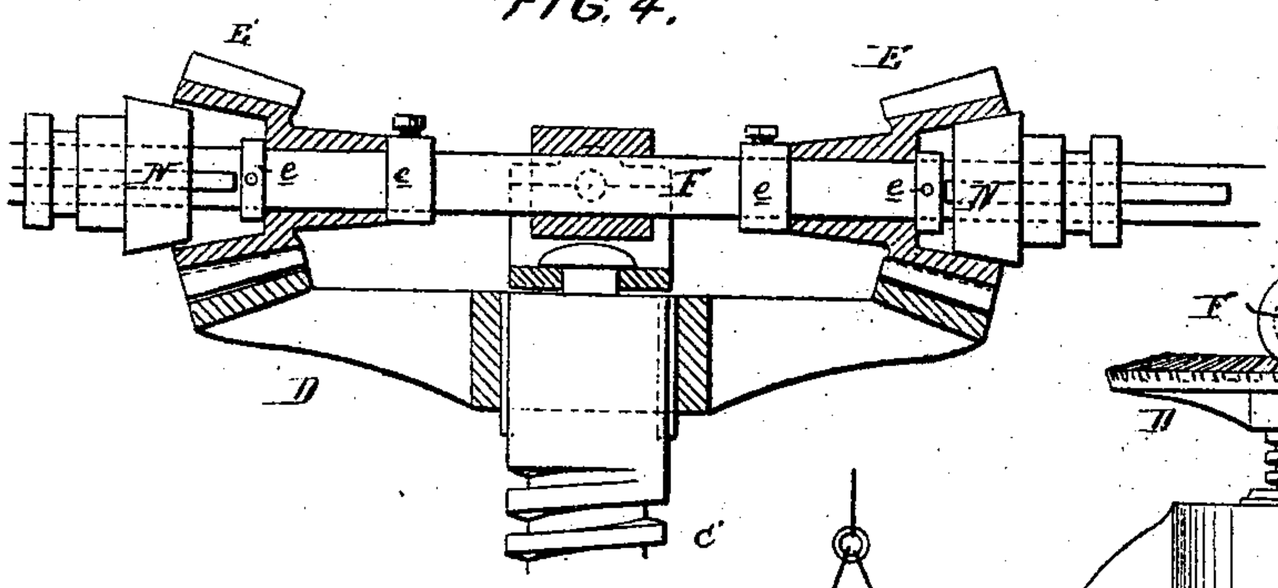


FIG. 3.

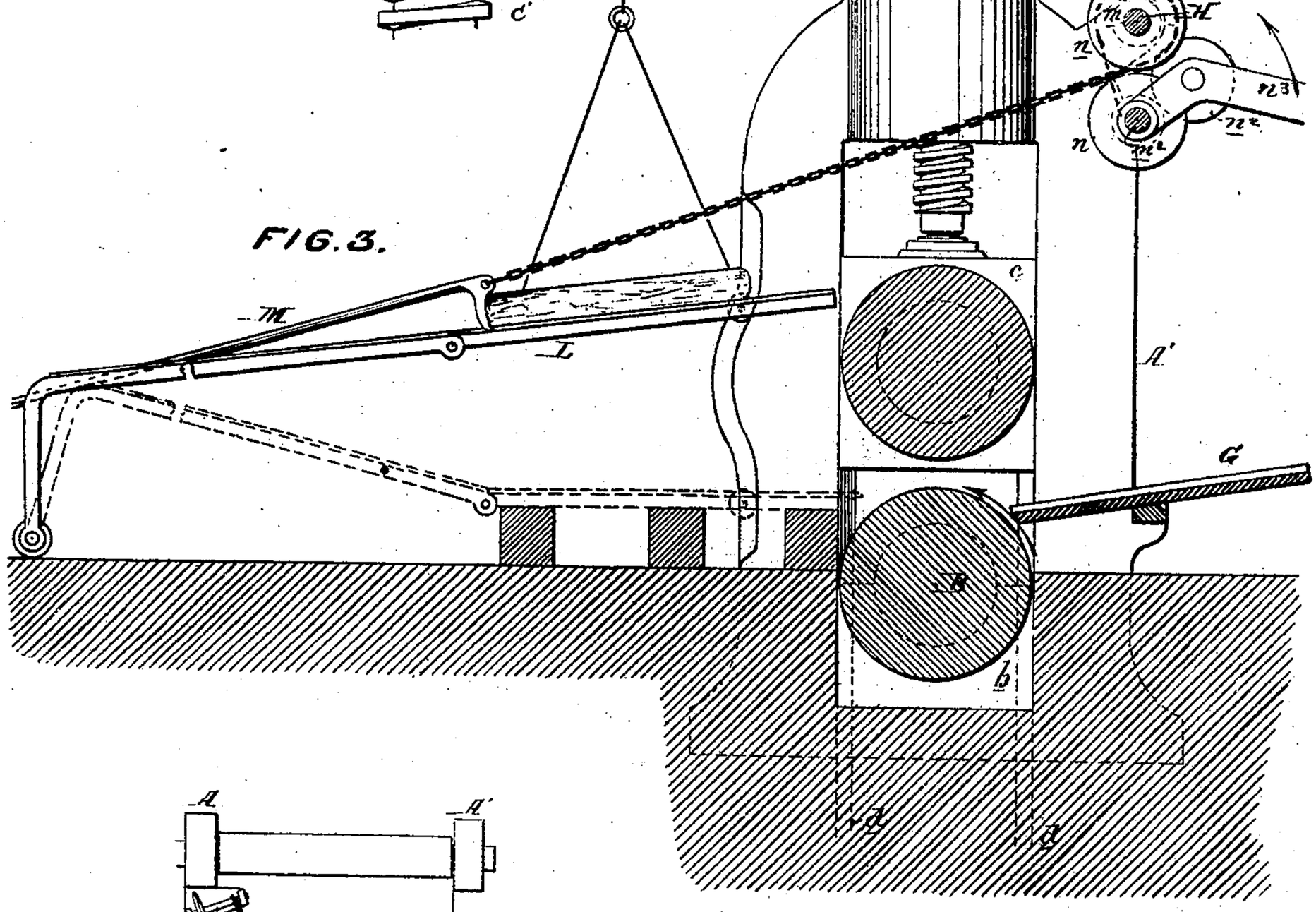
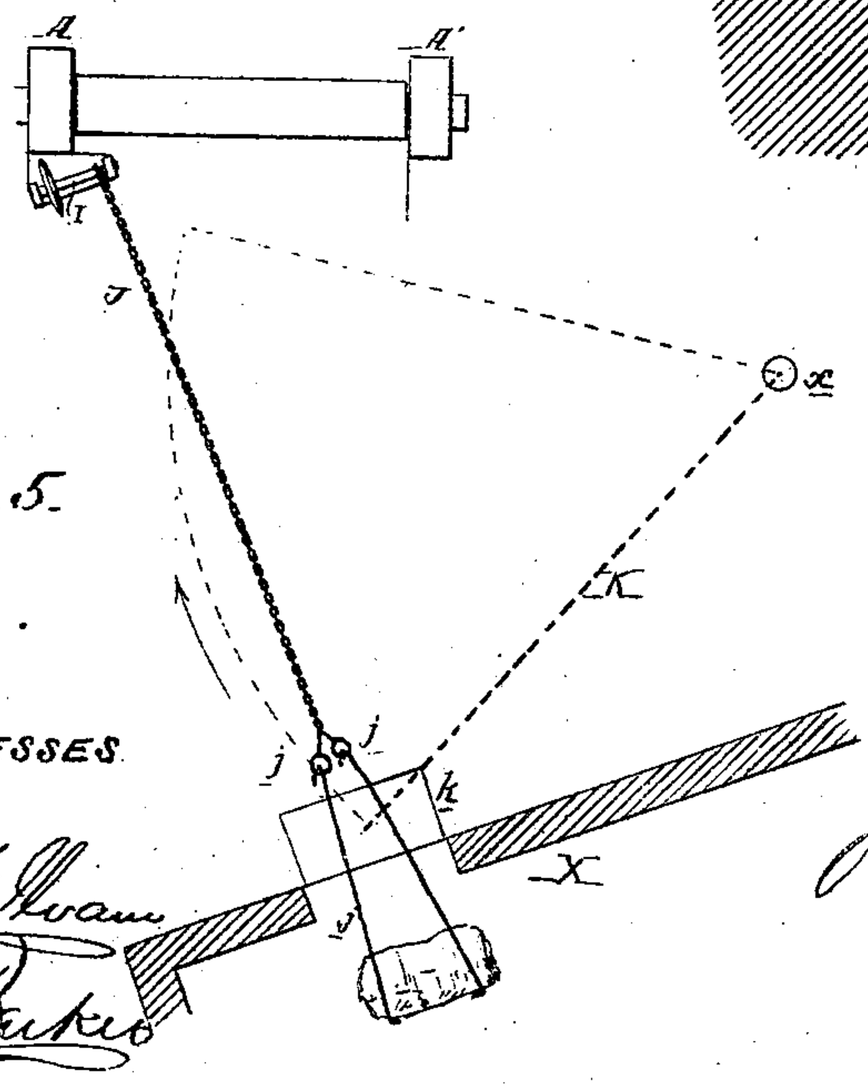


FIG. 5.



WITNESSES.

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3 Sheets--Sheet 3.

J. L. PENNOCK.

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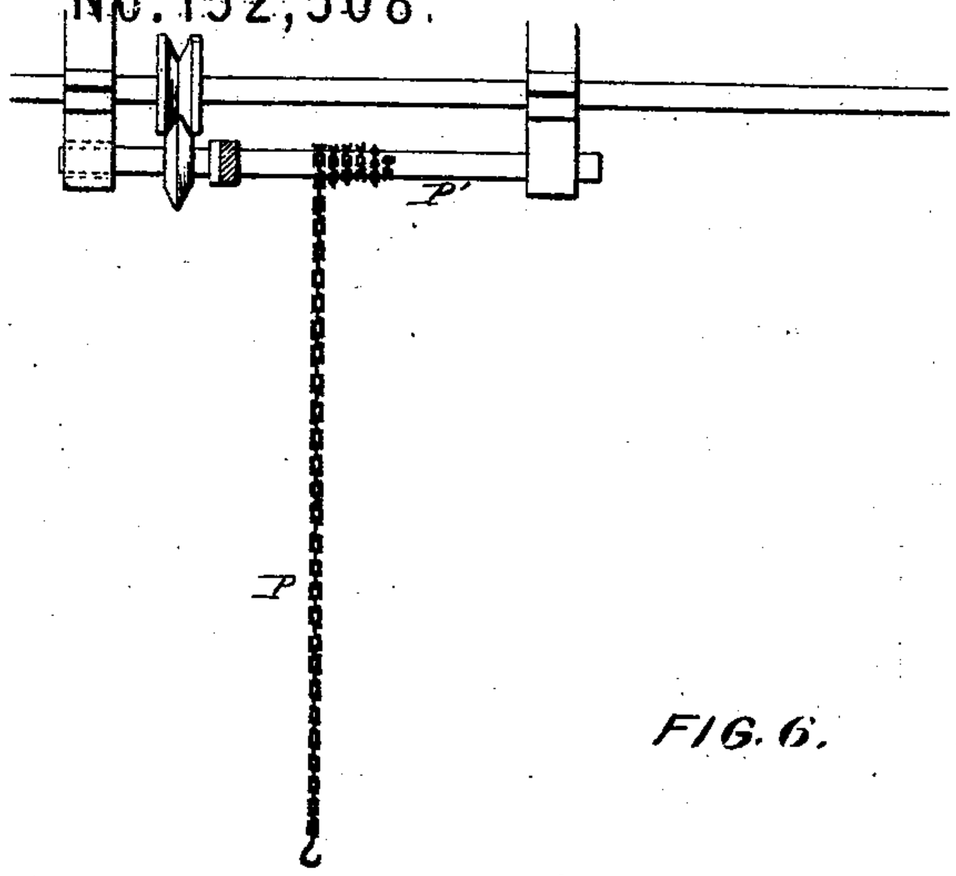

FIG. 6.

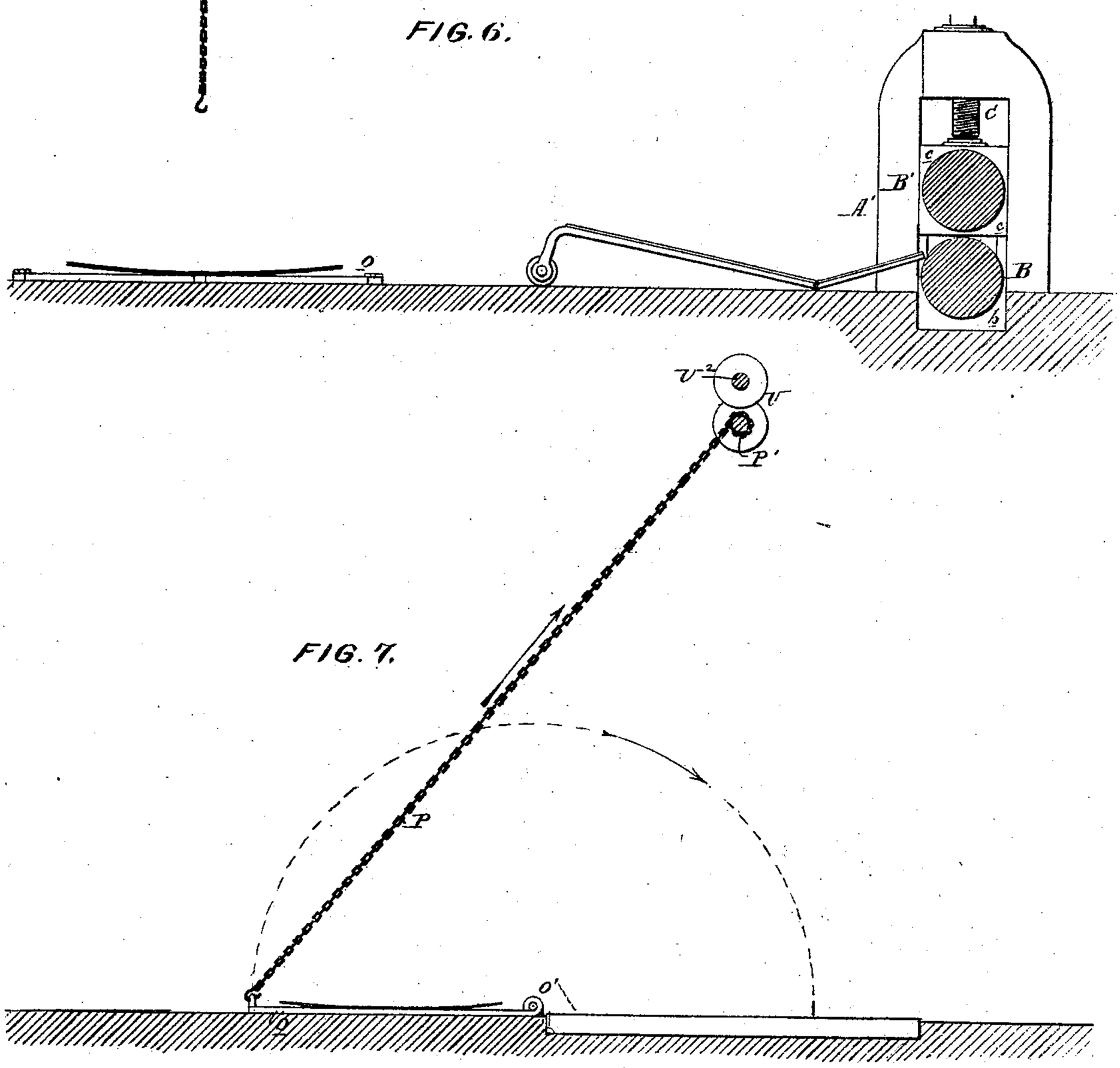

FIG. 7.

Scale - Fig's. 1. 2. 3. 1/2" = 1 Foot
" " 4/5 1" = 1 "
" 6. 7. 1/8" = 1 "
1/4" = 1 "

WITNESSES { Thos Millvain
John Parker

Joseph L. Pennock
by his Attys.
Howson & Sons

UNITED STATES PATENT OFFICE.

JOSEPH L. PENNOCK, OF COATESVILLE, PENNSYLVANIA.

IMPROVEMENT IN ROLLING-MILLS AND THEIR APPLIANCES.

Specification forming part of Letters Patent No. **152,508**, dated June 30, 1874; application filed October 23, 1871.

To all whom it may concern:

Be it known that I, JOSEPH L. PENNOCK, of Coatesville, Chester county, and State of Pennsylvania, have invented an Improvement in Rolling-Mills and Appliances connected therewith, of which the following is a specification:

My invention consists of certain improvements in and additions to rolls for rolling heavy plates, especially such as are used for the sheathing of iron-clad vessels; and the object of my improvements, which are too fully explained hereafter to need preliminary description, is to save much of the time and labor which the rolling of such plates has heretofore required.

In the accompanying drawings, Figure 1, Drawing No. 1, is a front view of the rolls, gearings, &c.; Fig. 2, Drawing No. 1, a plan view of the same; Fig. 3, Drawing No. 2, a transverse section on the line 1 2, Fig. 1; Fig. 4, Drawing No. 2, an enlarged detached view of the friction-gearing for operating the adjusting-screws; Fig. 5, Drawing No. 2, a diagram, illustrating the method of removing the pile from the furnace; Figs. 6 and 7, Drawing No. 3, views, drawn to a reduced scale, illustrating parts of my invention.

A and A′ represent the housings or end frames, secured to a suitable foundation, and connected together by tie-rods in the usual manner. The lower roll B revolves in fixed bearings *b b*, while the journals of the upper roll B′ revolve in bearings *c c*, which admit of being adjusted vertically in the housings A and A′ by the screws *c′ c*, one of which bears on the top of each of the bearings *c c*, rods *d d*, attached to the under side of the lowest of the bearings, extending downward to weights so arranged in a pit as to counterbalance the upper roll. To the upper end of each of the adjusting-screws C C′ is fixed a bevel-wheel, D, and into each bevel-wheel gear two bevel-pinions, E E′, confined between collars *e e* on a horizontal shaft, F, but capable of turning freely on the latter. Especial reference will be made to this mechanism hereafter. The shaft F, which turns in bearings on the housings, is provided with a pulley, *f*, for receiving a driving-belt from any adjacent shaft. G, Fig. 3, is an inclined table or platform, situated in front of the rolls, and extending from housing to housing, as seen in Figs. 2 and 3. H, Figs. 1 and 2, is a horizontal shaft, parallel with the rolls, and turning in bearings formed on or secured to the housings A A′, and having at one end a grooved friction-pulley, *g*, for receiving the beveled edge of the friction-disk *g′*, secured to a short shaft, I, which turns in bearings formed on a bracket, *h*, secured to the housing A, the outer bearing being elongated vertically, so that the outer end of the shafts can be elevated and its friction-disk *g′* brought into gear with the friction-pulley *g* by means of a lever, *g″*; or the shaft I may be lowered, when it will cease to derive motion from the shaft H, the latter being driven from the line-shaft above the rolls through the medium of a vertical shaft and bevel-wheels; or it may be driven by any other suitable system of gearing. To the shaft I is secured one end of a chain, J, Fig. 5, the other end of the chain being provided with hooks *j j*, for seizing the heated pile or fagot in the furnace X, as shown in the diagram, Fig. 5. It should be understood that between the furnace and the rolls there is a swinging crane, of which *x* represents the post, and the dotted line K the jib, from which a platform, *k*, for receiving the heated pile is suspended. At the rear of the rolls is an apron, L, made, in the present instance, in two parts, jointed together, and so connected by a chain to raising and lowering mechanism above the rolls that the apron can be made to assume the two positions shown by plain and dotted lines in Fig. 3. M is a tool, consisting of a lever or handle, to be manipulated by an attendant, and hooked at the end in the manner shown in Fig. 3, so as to catch against the rear end of a partly-rolled plate on the apron L; a chain, *m*, being attached to this tool, and passing round a loose sliding pulley, *m′*, on the shaft H, and thence to the shaft *m″*, to which the chain is attached, this shaft *m″* being adapted to bearings in the opposite housings, as shown in Fig. 1. The shaft *m″* is driven from the shaft H through the medium of a grooved friction-pulley, *n*, on the latter shaft, a smaller pulley, *n′*, on the shaft *m″*, and a beveled pulley, *n″*, adapted to the grooves of the other pulleys, and turning on a pin on the lever *n‴*, which is hung

to the shaft m'', and by operating which the beveled pulley n'' is made the medium of throwing the shafts H and m'' in and out of gear with each other. As before remarked, each of the adjusting-screws C and C′ is provided with a bevel-wheel, D, and into this wheel gear two pinions, E and E′, on the horizontal shaft F, as best observed in the enlarged view, Fig. 4. Into each bevel-wheel projects a conical friction-clutch, N, both clutches turning with the shaft F, but arranged to slide to and fro on the same. The clutches are controlled, in the present instance, by a rod, t, through the medium of levers $z\ z$ connected to the said rod and hung to a bar, s, secured to bearings in which the shaft F turns. By operating this rod both clutches may be moved out of gear with the pinions, in which case the adjusting-screw will be stationary; or one or other of the friction-clutches may be moved into gear with its pinion, according to the direction in which it is desired to turn the adjusting-screw. The screw in the opposite housing is provided with precisely similar stopping and reversing mechanism. At a suitable distance behind the rolls, and arranged on the floor, is a plate, O, hinged to a straightening-plate, O′, as seen in Drawing No. 3, and to the outer end of the plate O is connected a chain, P, attached to a shaft or chain-barrel, P′, driven, in the present instance, by friction-pulleys U from the line-shafting U″, suitable appliances being used for throwing these pulleys in and out of gear with each other, and thereby stopping and starting the said shaft P′.

The first step required is to remove the heavy heated pile from the furnace to the rolls, an operation which, as usually practiced, demands the hard work of several attendants, but which I accomplish with facility by the aid of the mechanism described above, and best observed in Fig. 5. The hooks attached to the chain J are first adjusted over the pile near the doorway of the furnace, and then by starting the shaft I in the manner described the chain is caused to draw the pile onto the platform K of the crane, (Fig. 5.) The jib of the latter is swung around, and the pile tilted onto the inclined platform G, Fig. 3, and at once presented to the rolls. In the meantime the hinged apron L has been lowered to the position shown by dotted lines, and the partially-rolled pile is directed onto it by the rolls. By manipulating the handles $t\ t$, Fig. 2, the upper roll is now lowered nearer to the under roll, preparatory to another pass of the partly-rolled pile, which is then rapidly returned to the front inclined platform G in the following manner: After the partly-rolled plate has been deposited on the apron L, I elevate the latter to the position shown by plain lines in Fig. 3, and, after applying the tool M to the rear of the plate, throw the pulleys $n\ n$ into gear with each other by manipulating the lever n^3, when the chain m will be wound around the shaft m'', and the plate will be pushed over the upper roll and fall onto the inclined front platform G prior to again passing between the rolls. These operations are repeated until the iron is reduced to the desired thinness, when it is dragged, by means of the chain P and its hauling mechanism, onto the plate O in the bent condition which it has assumed by passing between the rolls. The plate, however, is at once raised by the above-mentioned chain P and its hoisting mechanism, and the iron, while still hot, tilted up-side down onto the plate O′, on the face of which it can be much more readily straightened in an arched position than if the edges were turned up.

It will be seen that my improvements tend to facilitate and economize the process of rolling complete plates from the crude pile, inasmuch as the preliminary drawing of the pile from the furnace, the adjustment of the upper roll, the returning of the partly-rolled plate to the front of the rolls, the dragging of the iron to the straightening-plate, and the tilting of the rolled iron—duties heretofore accomplished by the severe labor of numerous attendants—are, by my improvements, carried out by easily-controlled power. Although I have described, and although I prefer, friction-gearing as a medium through which to operate the several parts above described, I do not desire to restrict myself to such gearing, for which other mechanism may be substituted without departing from the main features of my invention.

It should be understood that I do not here claim the apron L and its appliances for returning the partly-rolled bar to the front of the machine, inasmuch as these devices form a separate application for a patent; but

I claim as my invention—

1. In a rolling-mill the revolving shaft with its drum, chain, and grapple, or any equivalent power-driven hauling mechanism, in combination with a crane and platform, arranged and operating in connection with the said mechanism to receive the fagot from the same at the furnace and deliver it at the rolls.

2. The combination of the shaft or chain, barrel I on the rolls, the hauling-chain J, with its grappling-hooks, and the swinging crane with its platform K.

3. The combination, with rolls, of a power-driven shaft, F, adjusting-screw C, and gearing composed of a bevel-wheel, D, on each screw, and two pinions and clutches for each bevel-wheel, substantially as described.

4. The combination of the subject-matter of the preceding claim, and the levers $z\ z$ and rods $t\ t$, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH L. PENNOCK.

Witnesses:

WM. A. STEEL,

JOHN K. RUPERTUS.