No. 697,964. Patented Apr. 22, 1902.

M. BAACKES.

MILL FOR ROLLING TAPERING BODIES.

(Application filed Mar. 3, 1899. Renewed Aug. 30, 1901.)

(No Model.) 2 Sheets—Sheet 1.

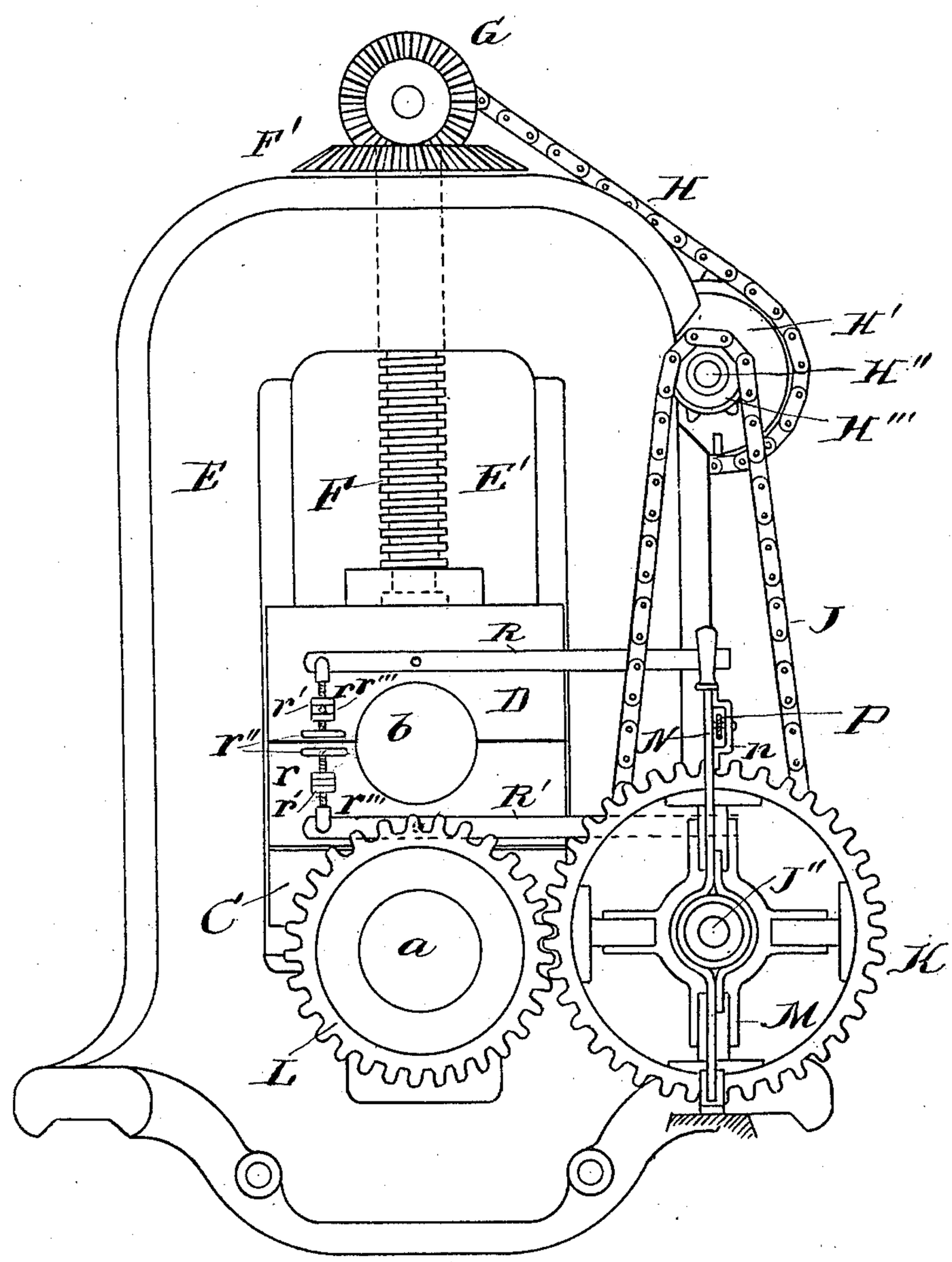

Fig. 1

Witnesses:
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W. F. Fecher

Inventor:
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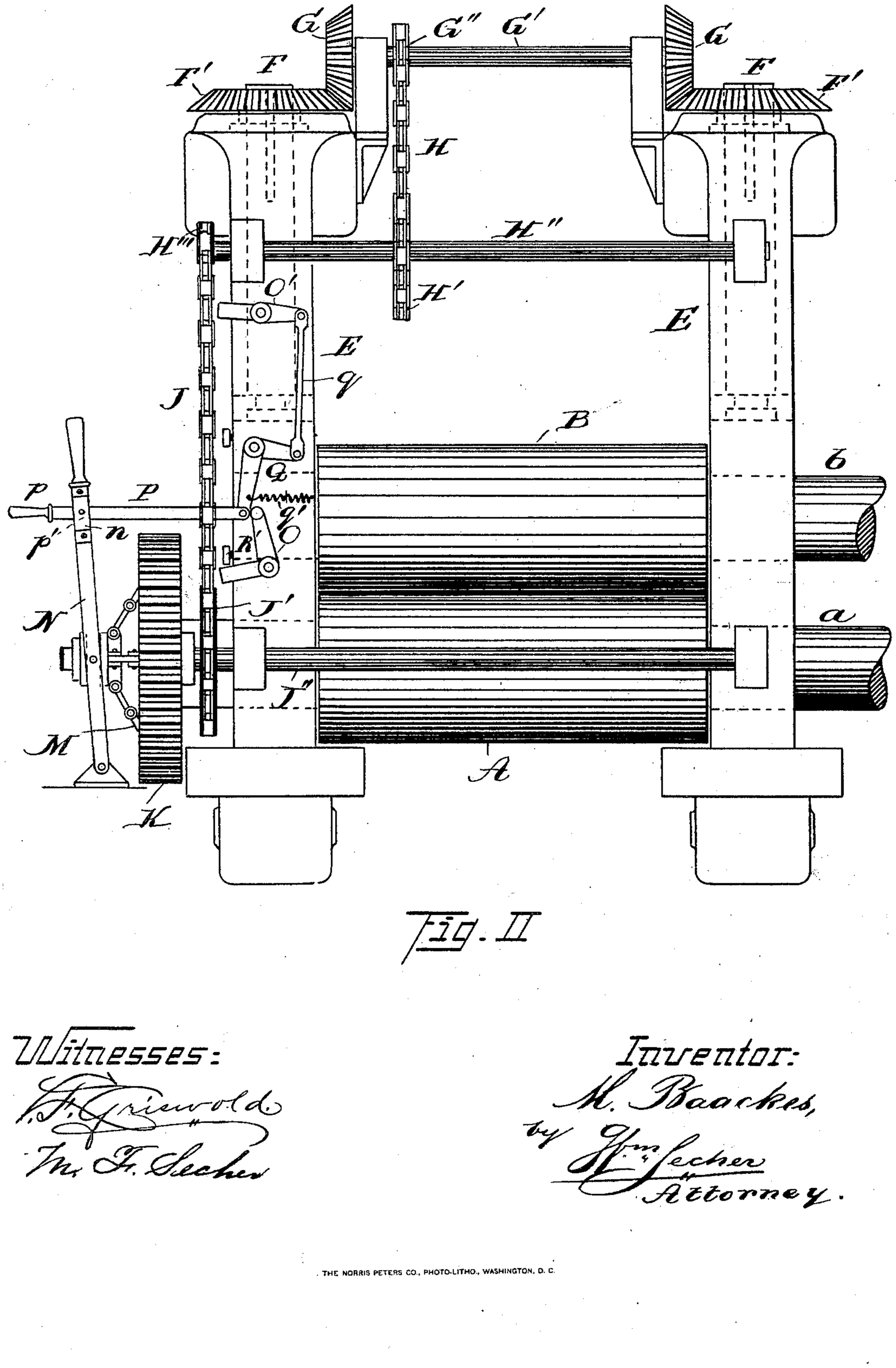

Fig. II

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UNITED STATES PATENT OFFICE.

MICHAEL BAACKES, OF CLEVELAND, OHIO.

MILL FOR ROLLING TAPERING BODIES.

SPECIFICATION forming part of Letters Patent No. 697,964, dated April 22, 1902.

Application filed March 3, 1899. Renewed August 30, 1901. Serial No. 73,821. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL BAACKES, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented certain new and useful Improvements in Mills for Rolling Tapering Bodies, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

The annexed drawings and the following specification set forth in detail one mechanical form embodying the invention, such detail construction being but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings, Figure I represents an end view of my improved rolling-mill for rolling tapering bodies, and Fig. II a front view of the same.

Heretofore a tapering body of wrought iron or steel has not been capable of production excepting by forging, as far as I have been able to discover. By "tapering body" I refer only to bodies of comparatively large size, such as cannon, as, of course, small bodies—such as nails, wedges, &c.—have been produced by stamping or other means. In forging large cannon or similar forgings into tapering shape great care has to be exerted in the heating and hammering that no undue uneven strain is exerted upon the forging and that evenly-sloping sides are formed upon the same. This required great skill in the heaters and hammersmen, and consequently renders the operation expensive, as such skilled mechanics require large wages. The operation of hammering a great tapering body is also slow, as the hammering can only proceed at slow speed and frequent reheatings of the forging are required, as the metal can only be successfully acted upon by the hammer at a certain heat and the forging will lose heat during the slow process of hammering. For the purpose of doing away with the slow process of forging I have devised means for rolling a heated ingot at the required taper, whereby a quicker method of treating such ingot is attained and an even taper is provided under an even strain.

I propose to utilize two ordinary rolls A and B, journaled in ordinary brasses or boxes C and D. The boxes D of the upper and vertically-movable roll B slide in the vertical openings E′ in the housings E. The shafts *a* and *b* of the rolls extend to one side of the housings and have suitable means for rotating them in unison, such as found in any ordinary stand of rolls. The upper and movable boxes D have the lower ends of two adjusting-screws F journaled in them in such manner that they may be raised or depressed by said screws, and the upper portions of said screws are threaded through the upper ends of the housings. The screws are vertically movable through two bevel-gears F′, journaled upon the tops of the housings, and said gears have feather-and-groove connections to the screws in such manner that the screws may move up and down in the bevel-gears and be rotated by and with the same. Said bevel-gears mesh with similar gears G upon a horizontally-journaled shaft G′ upon the housings, and said shaft has a sprocket-wheel G″ upon it, which is engaged by a chain H, passing around a sprocket-wheel H′ upon a counter-shaft H″, journaled upon the housings. Said shaft has a sprocket-wheel H‴ at its end, around which passes a chain J, which passes around a sprocket-wheel J′ upon a shaft J″, horizontally journaled at the foot of the housings. Said shaft has a gear-wheel K loose upon the shaft, which wheel meshes with a gear-wheel L upon the lower roll-shaft, and a friction clutch device M is secured upon the shaft J″ and engages the rim of said loose gear-wheel, so that the shaft may be rotated from the roll-shaft when the clutch is thrown in. A lever N is fulcrumed upon the mill-base and serves to throw the clutch in or out of engagement with the gear-wheel. A bell-crank O and a lever O′ are pivoted upon the face of the housing, one near the lower roll and one near the upper end of the opening in the housing, and a trip-lever P has its inner end pivotally connected to the upper arm of the bell-crank. The other arm of the bell-crank and one arm of the lever O′ project beyond the side of the housing to form triggers. The trip-lever has a handhold *p* at its outer end for manipulating it and has a notch *p′* near its outer end, which notch engages a pin in a loop *n* upon the side of the clutch-lever, so

that said lever may be rocked outward by the trip-lever. The lower arm of a bell-crank lever Q, which is fulcrumed upon the face of the housing, is pivoted to the trip-lever, near the inner end of the same, and said bell-crank has its other arm pivotally connected to a link q, the upper end of which is pivoted to the inner arm of the upper trigger-lever. A spring q' draws inward upon the lower arm of the bell-crank and returns the parts to their normal positions. Two stop-levers R and R′ are fulcrumed upon the side of the sliding box of the movable upper roll and have their forward ends projecting in such manner that the upper lever may engage the upper trigger and the lower lever may engage the lower trigger at the upstroke and downstroke, respectively, of the upper roll. The rear ends of each of the levers has the end of a screw r pivoted to it, which screw fits into a threaded sleeve r', having a hand-wheel r'' for rotating it and journaled upon the box in a bearing r''', so that the stop-levers may be adjusted with their stop ends higher or lower, according to the points of the travel of the upper roll at which it is desired to stop such movement.

In practice the size of the sprocket-wheels is adjusted so as to cause the adjusting-screws to raise and lower the movable roll at a rate corresponding to the incline of the sides of the ingot or bar to be rolled. The lower stop-lever is adjusted to trip the lower trigger and throw the clutch at the point of the downward movement of the movable roll when the rolls will engage the smallest end of the ingot, and the upper stop-lever is adjusted to trip the upper trigger and throw the clutch at the point of the upward travel of the movable roll when the rolls engage the largest end of the ingot. The movable roll may be set by its actuating mechanism to the point where the rolls will bite into the small end of the ingot. When the small end of the ingot is fed in between the rolls by suitable feeding or pushing mechanism, the roll-adjusting mechanism is started, and the ingot will be evenly reduced to a tapering shape by the gradually-separating rolls. When the thickest point of the ingot is reached, the upper trip will be operated and the roll will stop its upward movement. The rolls are now reversed and fed slightly together for further reduction, whereupon the ingot is fed through to its narrow end, the rolls gradually approaching and increasing the tapering reduction. The ingot may now be turned and again fed forward and back, whereupon the rolls may be further brought together for the next reduction and the stop-levers adjusted for a further descent and less ascent of the movable roll by depressing the inner ends of the stop-levers by their hand-wheels. A successive series of reductions of the sides of the ingot may thus be attained, and the ingot will be rolled to the same taper on all sides during its entire reduction. The stop-levers and the trigger mechanism are continually adjusted, so as to stop the vertical movement of the upper roll at the proper points, preventing it from going too far down or up. The even gradual rise or descent of the upper roll shapes the ingot to an even taper, and the metal in the ingot is in no manner strained or unevenly acted upon, as the vertical movement of the roll is in unison with the movement of the ingot fed through by the rotation of the rolls.

This mill, while capable of use for any tapering rolling, is particularly adapted for rolling heavy steel ingots into cannon, as the roll-feeding device insures a true taper and the rolling process enables an ingot to be much more quickly reduced than by hammering, thereby reducing the loss of time by frequent heatings and the burning of the metal consequent to such heating. The rolling process is also conducive to much more even reduction of the metal in the ingot than the hammering process, and the entire treatment of an ingot will require less time and demand less skilled labor than the slow, expensive, and difficult process of forging. The rolling action upon the metal of the ingot will also draw the fiber of the metal to greater advantage for strength than the crushing action of a power-hammer.

Other modes of applying the principle of my invention may be employed for the mode herein explained. Change may therefore be made as regards the mechanism thus disclosed, provided the principles of construction set forth, respectively, in the following claims are employed.

I therefore particularly point out and distinctly claim as my invention—

1. In a rolling-mill, the combination with a stationary roll, a movable roll, feed-screws for said movable roll, and mechanism connecting said screws to the roll-driving mechanism and constructed to actuate said screws to feed the movable roll toward and from the stationary roll in unison with the rotation of the rolls, of a clutch device in said connecting mechanism, adjustable stops connected to travel with the movable roll, and a device for throwing out said clutch device and provided with actuating-triggers in the path of said adjustable stops, substantially as set forth.

2. In a rolling-mill, the combination with a stationary roll and a movable roll, of feed-screws for said movable roll, bevel-gears connected to rotate said screws, a shaft having bevel-gears engaging said former gears and having a sprocket-wheel, a shaft having two sprocket-wheels, a chain passing around one of said latter wheels and said former wheel, a shaft having a gear loose upon it and engaging a gear upon the stationary-roll shaft and having a sprocket-wheel, a chain passing around said latter wheel and the other of said former wheels, a friction-clutch upon said former shaft and engaging the gear upon the

same, a hand-lever engaging said clutch, a bell-crank trigger and a trigger-lever upon the roll-housing, a bell-crank having an arm movably connected to the bell-crank trigger and the other arm connected to the trigger-lever by a link, a spring for returning the bell-crank to its normal position, a hand-lever pivoted to the bell-crank and bell-crank trigger and having a notch engaging the hand-lever, and two stop-arms pivoted upon the box of the movable roll and having means for adjusting them and projecting to engage the bell-crank trigger and the trigger-lever at the down and up stroke of the movable roll, substantially as set forth.

In testimony that I claim the foregoing to be my invention I have hereunto set my hand this 24th day of December, A. D. 1898.

MICHAEL BAACKES.

Witnesses:
WM. SECHER,
K. F. WINDING.