

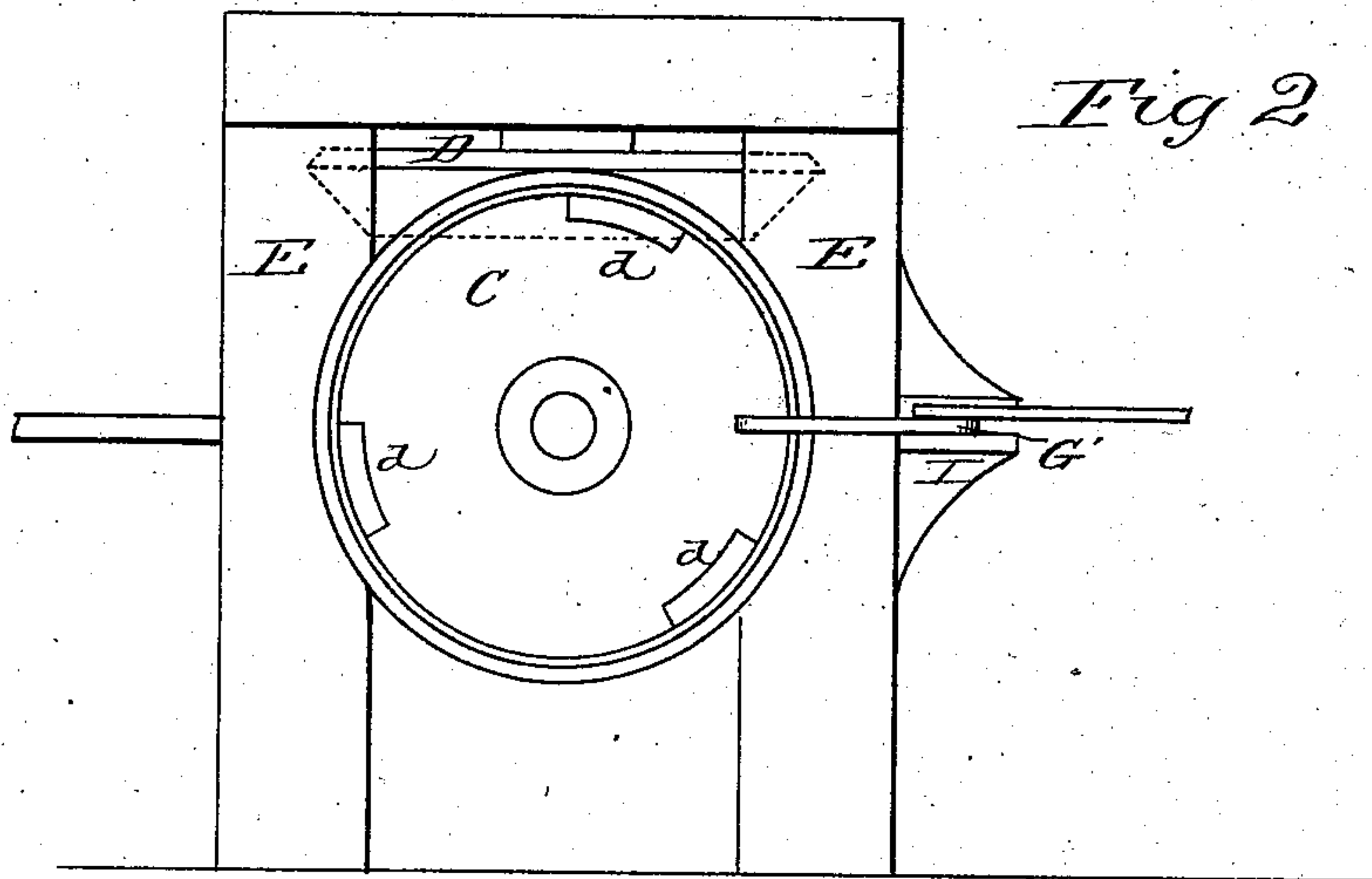
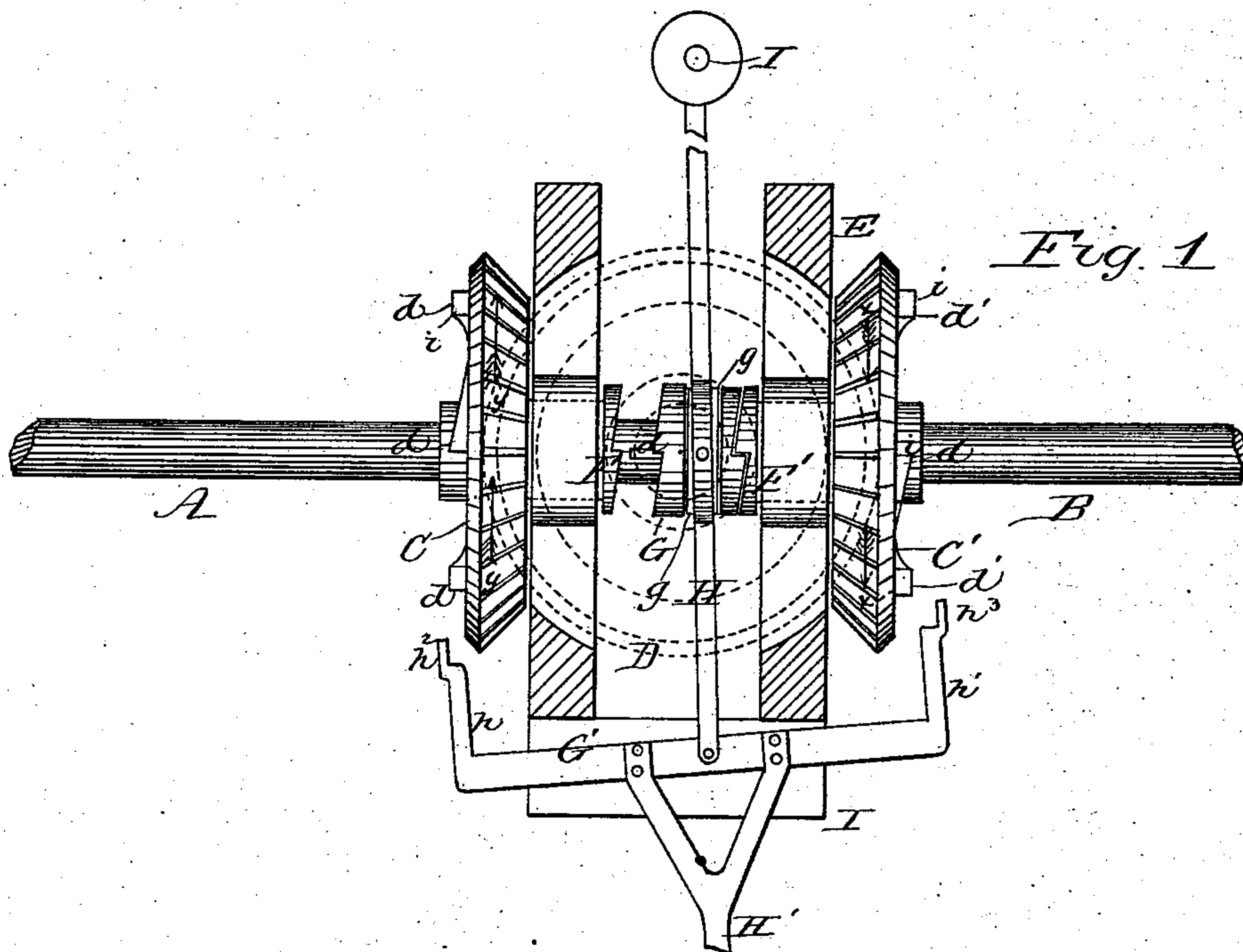
(No Model.)

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REVERSING MECHANISM FOR ROLLING MILLS.

No. 380,259.

Patented Mar. 27, 1888.



WITNESSES:

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REVERSING MECHANISM FOR ROLLING-MILLS.

SPECIFICATION forming part of Letters Patent No. 380,259, dated March 27, 1888.

Application filed January 26, 1888. Serial No. 261,931. (No model.)

To all whom it may concern:

Be it known that I, DANIEL B. HICKS, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Reversing Mechanism for Rolling-Mills; and I do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, which form part of this specification.

The object of my invention is to provide novel mechanism for automatically reversing the motion of the rolls in mills for rolling iron and steel.

In rolling plates of iron and steel the motion from the main or driving shaft is communicated to the lower roll, while the upper roll is free and turned by friction or gearing. In order to effect a reversal of the rolls for the successive passes without reversing the engine, a system of gearing and double-clutch mechanism is usually employed. The gearing-train consists of three beveled wheels, two of which are on the axis of the main shaft, while the intermediate wheel is on a vertical axis and is supported in housings, between which is located the clutch mechanism. The horizontal or main shaft is divided within the hub of one of the vertical wheels, while the latter is fastened to the included end of the main shaft. Motion is communicated to the roll-shaft by means of the sliding clutch member, which is shifted into engagement with the clutch-collars on the opposite gears alternately, according to the direction of rotation to be imparted to the roll. The reversing mechanism, particularly that employed in connection with plate or slab rolls, is of extraordinary size and weight, and in shifting the clutch by means of a clutch-lever the power of several men is now required to overcome the resistance of the machinery and effect the proper engagement and disengagement of the clutch member.

My invention contemplates the provision of devices whereby the shifting of the clutch and the reversing operations are performed automatically and by power derived from the main shaft and imparted to the clutch-moving lever through the medium of the gear-wheels.

My invention accordingly consists in the novel construction and combination of devices, hereinafter described and claimed, the same comprising a series of cams on the backs of the vertical gear-wheels and a pivoted dog connected to the clutch-lever and adapted to be brought into engagement with said cams in such a manner that by one movement of the dog the clutch will be disengaged from one of the gear-wheels, and by a further movement of the dog the clutch will be shifted into engagement with the other wheel and the motion of the roll reversed.

In the accompanying drawings, Figure 1 is a horizontal sectional view through the housings of the reversing-gearing, and Fig. 2 a side elevation of the same.

A designates the main or power shaft, receiving constant motion in one direction from the engine.

B designates the shaft of the lower roll of a plate or other mill, aligned with the shaft A.

C C' designate the vertical and D the horizontal gear-wheels of the reversing-train, mounted on housings E E.

F F' are the hubs of the wheels C C', each formed with or having rigidly attached to it one of the members of a double reversing-clutch.

G is the shifting member of the clutch, and H the shifting beam or lever pivotally attached to a collar, g, encircling the member G, and at its rear end pivoted upon a post, standard, or frame, I.

The main shaft terminates within the hub of the wheel C, which also receives the end of the roll-shaft. The latter is formed with a spline, d, while the clutch member is correspondingly grooved, so that it will engage with and impart motion to the roll-shaft. The wheels C C', being in gear-connection with the wheel D, rotate in opposite directions, and the rotation of the roll-shaft in either direction is controlled by the position of the clutch, which receives its motion from the wheels C C' alternately.

For the purposes of my invention I form each of the wheels C C' with a series of beveled projections or inclines, d d', on their backs, the number of such projections or cams corre-

sponding with the teeth of the clutch, their beveled or cam surfaces inclining or diminishing in the same direction. The projections, which are in the nature of cams and designed
5 and adapted to serve the same purpose, are located as near to the peripheries of the wheels C C' as possible, so as to be in convenient reach of the dog through which the clutch-lever is operated.

10 G' designates the dog, the same consisting of a bar of iron or steel of suitable dimensions provided with an operating-handle, H', and pivotally connected at its middle part to the end of the clutch-lever, the latter being short-
15 ened, as shown. The ends of the bar G' are turned inwardly, or in the direction of the wheels, and formed with hooks or fingers h^2 h^3 at the extremities of the inturned arms h h' .

The bar or dog is conveniently supported
20 upon a plate, bracket, or shelf, I, secured to the front of the housings, and is capable of being swung around independently of the clutch-lever, so as to be brought into operative engagement with either of the wheels C C'. In
25 Fig. 1 of the drawings the shifting clutch member is represented as being in engagement with one of the clutch-collars and as receiving motion from the wheel C', turning in the direction of the arrows x x , and communicating motion in the same direction to the roll-
30 shaft.

The dog G' is shown in the position it assumes when the wheel C' and clutch are in engagement, the inner edge of the arm h' being
35 just beyond operative reach of the projections d' on the back of the wheel C'. Now, in order to shift the clutch and reverse the motion of the roll-shaft, the dog is first swung around on its pivot until the finger h^2 touches the back
40 of the wheel C on a line with the cam projections d . The first approaching projection or cam immediately engages with the finger h^2 by passing under or behind it, and by reason of the bevel of the cam projection d bears against
45 the finger h^2 and causes the dog G', and with it the clutch and clutch-lever, to be shifted sufficiently to disconnect the clutch from the wheel C'. The dog is then swung around in the same direction as before and sufficiently to now
50 bring the arm h in the way of the next approaching cam, which forces the dog, lever, and clutch still farther and into the position corresponding to that shown on the right in Fig. 1, wherein the clutch will be in full engage-

ment with the wheel C, turning in the direction 55 of the arrows y y , and the motion of the roll reversed. As will be seen, the only manual operation required is in swinging the dog into proper position for engagement with the beveled cams. This operation requires but little
60 skill or strength, and may be effectually accomplished by a boy. All the other operations are entirely automatic and are effected with evenness and certainty and without the strain and injurious wrenching incident to the
65 present crude method of operating the clutch.

It will be observed that, inasmuch as the wheels C C' rotate in opposite directions, the cams on the wheel C C', respectively, are inclined or beveled in opposite directions. I
70 have shown the cams as being so located that their shoulders i i are nearly coincident with the shoulders of the clutch-teeth, my object in so arranging the cams being to obtain a true and full engagement of the shifting clutch
75 member with the clutch-collars, and thus avoid the jolting, jarring, or straining which occurs when the points of the clutch-teeth come in contact and there is a failure to make full
80 connection.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In reversing mechanism for rolling-mills, the combination, with the gears of the revers- 85 ing-train and the shifting and stationary clutch members, of mechanism connected with the clutch-lever and engaging with the vertical gear-wheels, whereby the shifting of the clutch and reversal of the roll-shaft are produced auto- 90 matically, substantially as described.

2. In reversing mechanism for rolling-mills, comprising a train of gearing and shifting and stationary clutch members, the combination, with the vertical gear-wheels provided with 95 cams or beveled projections on one of their faces, and with the shifting clutch member and clutch-lever, of a dog or frame pivotally attached to said clutch-lever and constructed and adapted to engage with said cams alternately, 100 substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand this 18th day of January, 1888.

DANIEL B. HICKS.

Witnesses:

THOS. A. CONNOLLY,
H. C. EVERT.