

No. 654,080.

Patented July 17, 1900.

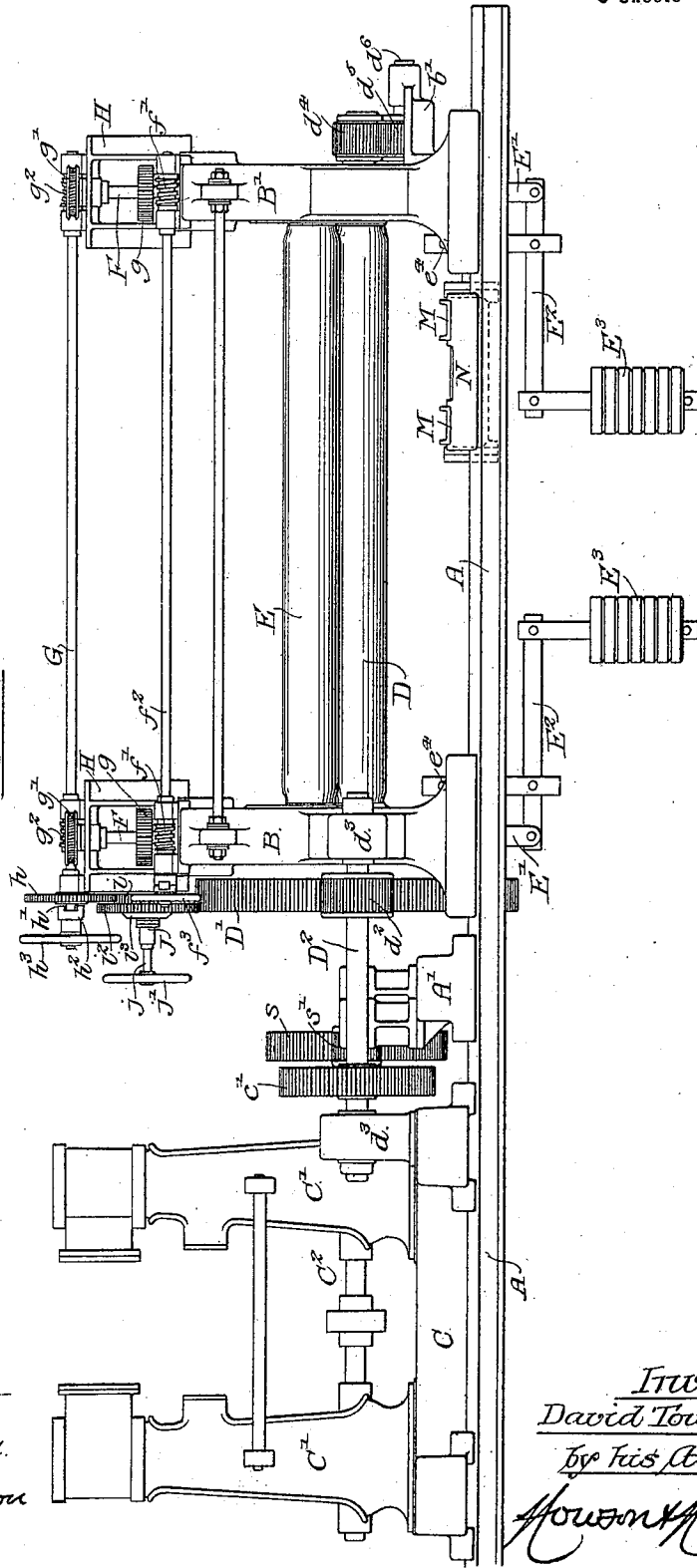
D. TOWNSEND.
PLATE STRAIGHTENING MACHINE.

(Application filed Aug. 26, 1898.)

(No Model.)

5 Sheets—Sheet 1.

Fig. 1.



Witnesses:-
 Louis W. Whitehead.
 Charles DeLeon

Inventor:-
 David Townsend
 by his Attorneys:
 Howard & Howard

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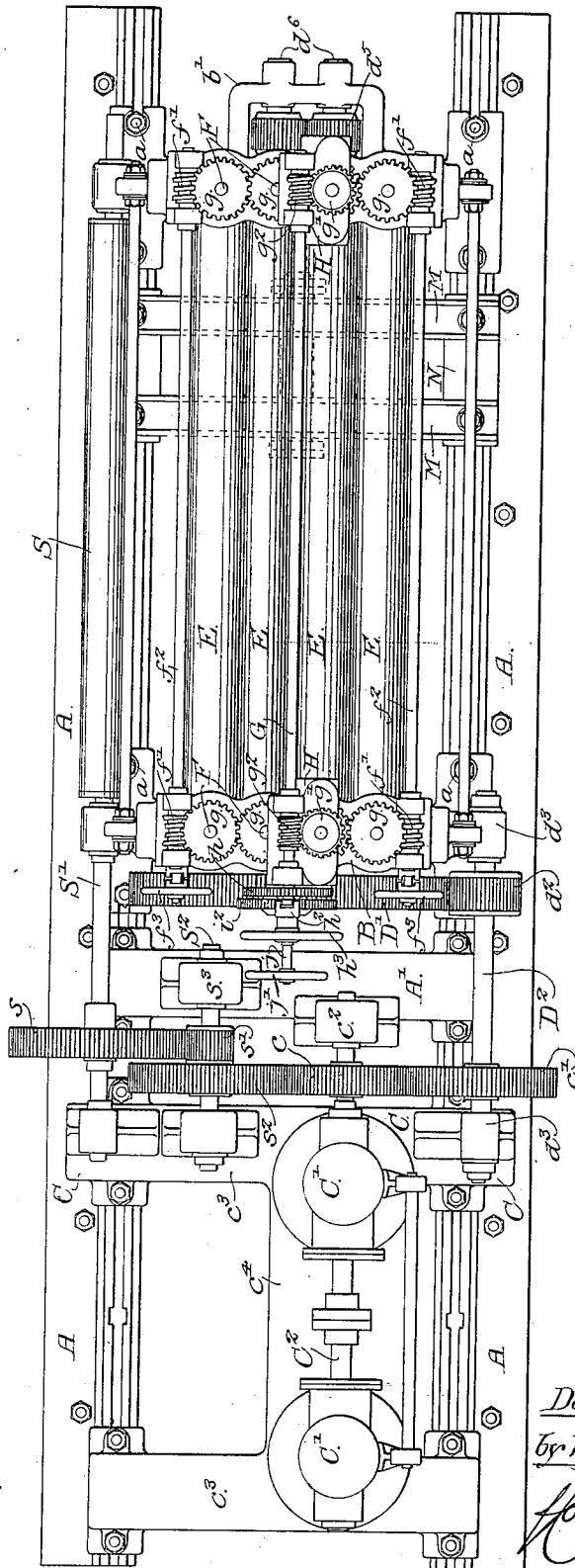


Fig. 5.

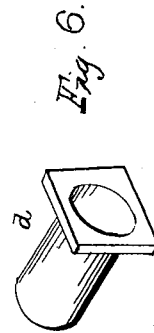


Fig. 6.

Witnesses:-
 Louis M. Whitehead.
 Charles DeCoo.

Inventor:
 David Townsend
 by his Attorneys:-
 Howson & Howson

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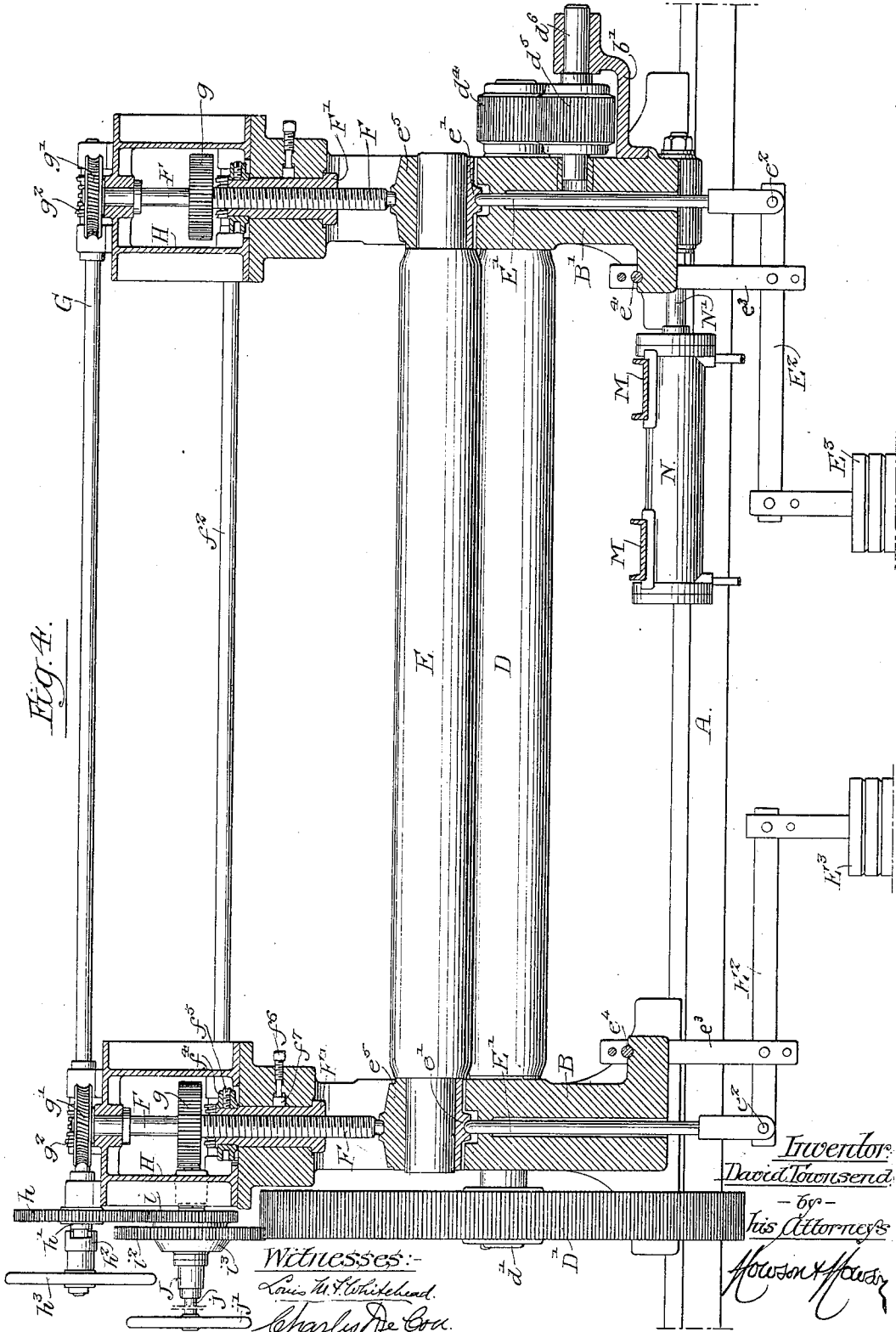
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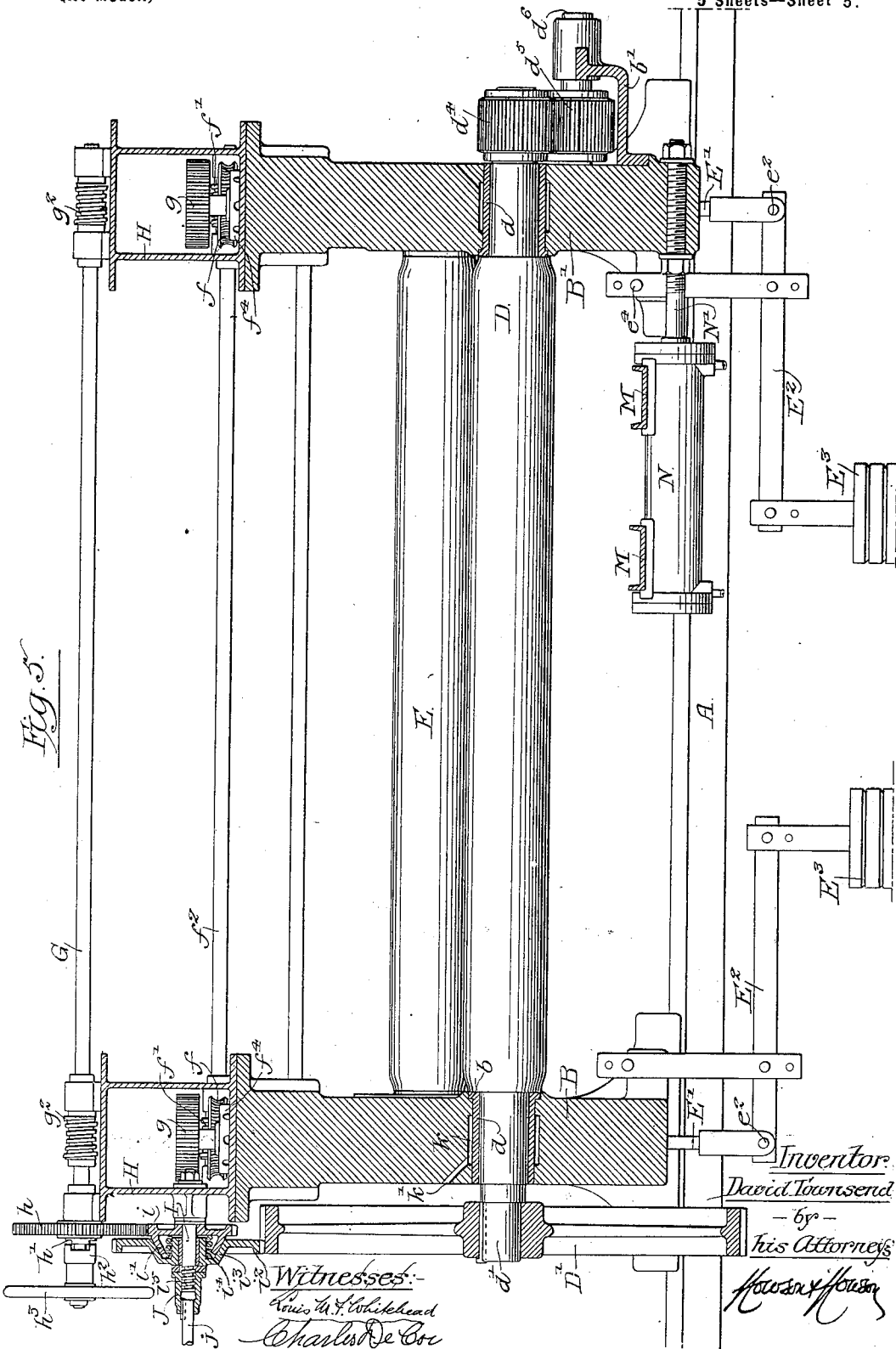


Fig. 5.

Witnesses:
 Louis W. Whitehead
 Charles De Cor

Inventor:
 David Townsend
 - by -
 His Attorneys
 Messrs. Housar & Housar

UNITED STATES PATENT OFFICE.

DAVID TOWNSEND, OF PHILADELPHIA, PENNSYLVANIA.

PLATE-STRAIGHTENING MACHINE.

SPECIFICATION forming part of Letters Patent No. 654,080, dated July 17, 1900.

Application filed August 26, 1898. Serial No. 689,594. (No model.)

To all whom it may concern:

Be it known that I, DAVID TOWNSEND, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain
5 Improvements in Plate-Straightening Machines, of which the following is a specification.

The object of my invention is to improve the construction of a plate-straightening machine, so that the parts can be readily adjusted and by which better work can be produced.

Referring to the accompanying drawings, Figure 1 is a side view of my improved plate-straightening machine. Fig. 2 is a plan view.
15 Fig. 3 is an enlarged end view. Fig. 4 is a longitudinal section on the line 4 4, Fig. 3. Fig. 5 is a section on the line 5 5, Fig. 3. Fig. 6 is a perspective view of one of the bushings.

20 In straightening rolled plates it is essential that the straightening-rolls be accurately adjusted and the mechanism so arranged as to be quickly operated. Furthermore, it is important that the framework of the machine be mounted on a firm foundation, but so that it
25 can be adjusted either bodily or in sections.

A A are the two shoe bed-plates firmly secured to the foundation, and upon these bed-plates are housings B B', secured in position
30 by bolts *a* or other fastenings. The shoe bed-plates are longer than the machine, and on the extension of these bed-plates is mounted the frame C, supporting the driving mechanism. In the present instance I have shown
35 two vertical steam-engines C' in outline; but it will be understood that electric or other motors may be substituted for the steam-engines, if desired.

D represents the lower set of straightening-rolls, and E represents the upper set. The lower set of rolls are of the form clearly illustrated in Fig. 5 and adapted to bushings *d*,
40 mounted in the housings B B'. The outer flanges of the bushing are square, so as to fit between the ribs *b* of the housings, thus preventing the bushings turning with the rolls.

The central roll has an extension *d'* at one end, on which is mounted a large gear-wheel D', which meshes with a gear-wheel *d*² on a
50 shaft D², adapted to bearings *d*³, one on the housing B and the other on the engine-frame C.

C² is the crank-shaft of the engine and has

a gear-wheel *c*, meshing with a wheel *c'* on the shaft D², so that motion is imparted to the lower set of rolls D through the train of
55 gears.

On the spindle of each of the lower rolls D are gear-wheels *d*⁴, which mesh with intermediate wheels *d*⁵, mounted on shafts *d*⁶, adapted to bearings in the housing and in a bracket
60 *b'*. By this arrangement of gears the lower rolls turn in the same direction and in unison.

In the present instance there are three lower rolls and four upper rolls. Each of the upper rolls is adapted to rest in half-boxes *e*,
65 having projections *e'* on the under side, and each of these projections has a cavity for the reception of a counterbalance-rod E', connected to a lever E² at *e*². The lever in turn is hung from a link *e*³, supported at *e*⁴ on an
70 extension of the housing. The lever E² carries counterbalance-weights E³, adapted to each end of each upper roll, so as to counterbalance each roll that it may be independently and readily adjusted.
75

The rods E' pass through vertical openings in the housings, as illustrated in Fig. 4.

Mounted on each journal of the upper rolls are cap-bearings *e*⁵, and above each of these cap-bearings is a screw F. This screw is
80 adapted to a nut F', mounted in the housing. The screws of each end roll are provided with worm-wheels *f*, gearing with worms *f'* on shafts *f*², having hand-wheels *f*³, so that either one of the end rolls can be adjusted
85 independently of the two central rolls. Each screw is provided with a gear-wheel *g*, the adjoining wheels meshing. The screws of one of the center rolls are extended, and each screw is provided with a worm-wheel *g'*, which
90 meshes with a worm *g*² on a shaft G, and on turning this shaft all the screws are raised or lowered. When the screws are raised, the weights E³ will elevate the rolls, so as to keep them in contact with the bearing caps and
95 screws, as the weights E³ overbalance the rolls.

I provide mechanism whereby one end or the other of the rolls may be raised or lowered, or both ends may be raised or lowered. If, for instance, a thick sheet is to be straight-
100 ened, then both ends of the several rolls are raised; but if the pressure is to be relieved on one side more than on the other then only one end of each roll is elevated, and, furthermore,

if it is desired to raise or lower each of the center rolls independently I can do so by turning the nuts F' , as shown in Fig. 4. On the upper end of each nut is a collar f^4 , secured to the nut by a set-screw f^5 , and this collar has a series of perforations in the present instance, so that the bar can be inserted into any one of the perforations after it has been released by unscrewing the set-screw f^6 , which presses against the block f^7 in the housing, this block in turn pressing against the nut F' .

In order to raise and lower the upper rolls by power, I loosely mount on the shaft G , which extends across the full length of the machine, a loose gear-wheel h , having clutch-teeth h' , adapted to engage a clutch-head h^2 on a wheel h^3 , adapted to slide on but turn with the shaft G , so that when the hand-wheel h^3 is forced forward it engages with the teeth of the wheel h , and if this wheel is driven it will turn the shaft G , and consequently raise or lower the several screws at each end of the machine, as there are worms g^2 at each end of the shaft, which engage with the worm-wheels g' , described above.

The gear-wheel h meshes with a wheel i , adapted to a fixed stud I , projecting from the bearing H on the housing, and this wheel has a cone extension i' , forming the internal cone of a clutch. A gear-wheel i^2 has a cone extension i^3 , forming the outer cone of the clutch, so that when the two cones are forced together the friction will cause them to turn in unison.

The wheel i^2 meshes with the main driving-wheel D' , Fig. 5, so that when the driving-wheel is in motion the wheel i^2 is also in motion. In order to keep the wheels i and h normally at rest, I provide a spring i^4 , which forces the wheel i^2 away from the wheel i as soon as the wheel is released from the control of the threaded head J , which is adapted to threads i^5 on the stud I . This head has a short extension j in the form of a shaft provided with a hand-wheel j' , so that on turning the hand-wheel and the head in one direction the wheel i^2 will be forced in frictional contact with the wheel i and motion will be imparted to the shaft G from the main driving-wheel. On the reverse movement the wheel will be released and the spring will force it out of frictional contact with the wheel i . It will thus be seen that the several screws for adjusting the rolls can be turned by simply throwing in one clutch and they can also be moved by hand by throwing out the clutch and turning the screws by the hand-wheel.

In order to keep the bearings of the lower rolls cool, I enlarge the openings in the housings for the bushings, forming water-cavities k , Fig. 5, and drill diagonal passages k' , which communicate with these water-cavities. Suitable water-pipes may be tapped into these passages, so that a continuous stream of water will flow into the cavities and around the bearings, and I form an outlet k^2 from the

cavities to the vertical openings in the housings for the rods of the counterbalance device H , so that there will be a continuous flow of water through the cavity.

I secure to cross-beams $M M$, attached to the shoe bed-plates A , a hydraulic cylinder N , the piston N' of this cylinder being secured to the housing B' . This cylinder is for the purpose of moving the housing B' when it is desired to remove any one or all of the rolls D or E , and by simply loosening the bolts a , which hold the housing to the bed-plates and detaching certain of the parts, fluid introduced into the cylinder will move the housing on the bed-plate, so that access may be had to any one or all of the rolls. When the rolls are in position, all that is necessary is to move the housing back to its normal position by means of the hydraulic mechanism.

S is a roll mounted on a shaft S' , adapted to bearings on the housings, and this roll is the feed-roll for the machine and is situated, preferably, at the end of a train of rolls which feed the plate to the machine. The shaft S' also has its bearings on a standard secured to the engine base-plate C and has a wheel s geared to the wheel c on the driving-shaft C^2 of the engine.

The standards c^2 and s^3 have bearings for the shafts C^2 and S^2 , respectively, and are mounted on a cross-frame A' , situated between the housing B and the engine bed-plate C . When the feed-roll S is dispensed with, as in the case where the feed-roll of the feed-table is independently driven, then this intermediate cross-frame A is dispensed with.

It will be noticed that the engine base-plate C has two end members c^3 c^3 and a cross member c^4 , which is mounted at one side of the center and on which the vertical engines are placed. This engine base-plate C is secured to the shoe bed-plates by bolts, so that it can be readily detached from the base-plate and moved thereon or shifted, as desired, and it can be reversed, so that the engine can be arranged at the front or back, as desired. It will also be seen that by arranging the machine on the two shoe bed-plates it can be built irrespective of the space in which it is to be finally located. The housings and the engine-plate can be secured on the shoe bed-plates in any desired position. This is a great convenience in assembling the machine in a rolling-mill, as the parts can be made and assembled, and if any change is desired in the location of the machine the parts can be readily adjusted.

It will be understood that in some instances the machine may be driven from an isolated engine, through the medium of belting, when it is not desired to use the independent engine. In this case the engine base-plate is dispensed with and the mechanism geared to an intermediate clutch-shaft.

I claim as my invention—

1. The combination in a plate-straightening

machine, of housings, boxes mounted in said housings, a series of upper and lower straightening-rolls mounted in the boxes, means for driving the lower set of rolls, means for adjusting each of the upper rolls, and independent counterbalance mechanism for each end of each upper roll, substantially as set forth.

2. The combination in a plate-straightening machine, of housings, two rows of boxes in each of said housings, a series of rolls mounted in the lower boxes, means for driving said rolls, a series of rolls mounted in the boxes above the spaces between the lower rolls, and counterbalance mechanism for each end of each upper roll, substantially as set forth.

3. The combination in a plate-straightening machine, of the housing, the upper and lower rolls, screws for adjusting the upper rolls, gears on the screws meshing one with another so that when one screw is turned the series will be turned, a worm-wheel on an extension of one of the screws, a shaft having a worm meshing with the worm-wheel, a gear-wheel loose on the shaft, and clutching mechanism by which the wheel can be secured to the shaft, a wheel meshing with said gear-wheel and having a clutch-face, another gear-wheel also having a clutch-face adapted to engage the clutch-face of the intermediate gear, said gear-wheel being driven from the main driving-wheel of the machine, substantially as described.

4. The combination of the upper and lower rolls, a screw for adjusting one of the upper rolls, means for turning said screw, a nut mounted within the housing and through which the screw passes, mechanism for turning said nut, and adjustable means for holding the nut from turning in the housing, substantially as described.

5. The combination in a plate-straightening machine, of the housing, a series of lower rolls and a series of upper rolls above the spaces between the lower rolls, bushings for the lower rolls, vertical channels between the bushings of the lower rolls for the passage of counterbalance mechanism for the upper rolls, and water-spaces surrounding the bushings of the lower rolls and communicating with the channels, substantially as described.

6. The combination of a driven wheel having a clutch-face, a gear-wheel also having a clutch-face, means for moving one wheel toward or from the other, an operating-shaft, a gear-wheel loose on said shaft and meshing with the clutch gear-wheel, with means for

connecting the said wheel to the operating-shaft, substantially as described.

7. The combination in a plate-straightening machine, of the two housings, a series of upper and lower straightening-rolls, means for driving the lower rolls, counterbalance mechanism for each end of each upper roll, nuts in the housings, screws passing through the nuts and adapted to adjust the upper rolls, a frame mounted on each of the housings, a cross-shaft adapted to bearings in each frame and geared to the screw-shaft, a gear-wheel on said cross-shaft, a stud projecting from one of the frames, a pinion meshing with the gear-wheel, a driven gear-wheel also on the stud, and friction mechanism between the driven gear-wheel and the pinion, substantially as described.

8. The combination in a plate-straightening machine, of the two housings, the upper and lower series of rolls mounted in the housings, a large gear-wheel mounted on the journal of one of the lower rolls, the other rolls being geared to said driven roll, screws for adjusting the upper rolls, a cross-shaft extending from one housing to the other and geared to the screws, a gear-wheel meshing with the large gear-wheel of the lower roll, a pinion, clutch mechanism between the gear-wheel and the pinion, a gear-wheel on the cross-shaft meshing with the pinion, and a hand-wheel on the cross-shaft, substantially as described.

9. The combination in a plate-straightening machine, of housings, two sets of bearings in each housing, a series of upper rolls mounted in one set of bearings, and a series of lower rolls mounted in the other set, a large gear-wheel mounted on the journal of one of the lower rolls, the other rolls of the lower set being geared to the said driven roll, counterbalance mechanism for the upper rolls, screws for adjusting the upper rolls, a shaft extending from one housing to the other and geared to the several screws, a gear-wheel meshing with the large gear-wheel of the lower roll, and connected to the transverse shaft, substantially as described.

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

DAVID TOWNSEND.

Witnesses:

EDWD. RAMSEY,
F. E. BECHTOLD.