No. 891,126. PATENTED JUNE 16, 1908.

J. S. WORTH.

ROLLING MILL TABLE.

APPLICATION FILED JULY 7, 1905.

5 SHEETS—SHEET 1.

Fig. 10.

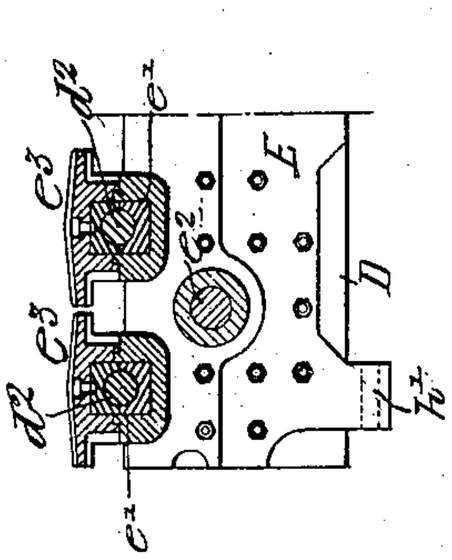

Fig. 8.

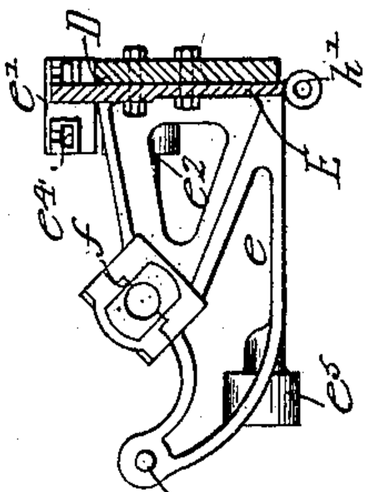

Fig. 9.

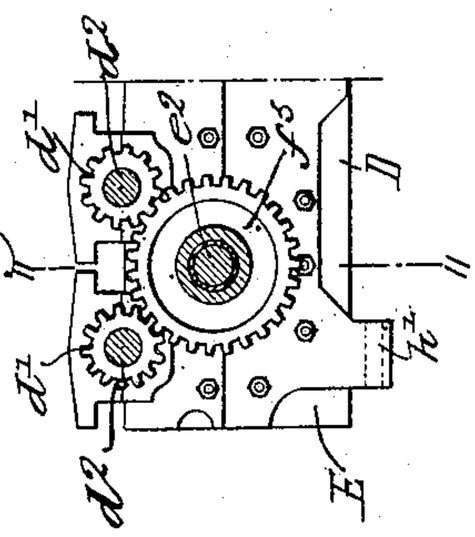

Fig. 1.

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Inventor:
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No. 891,126.

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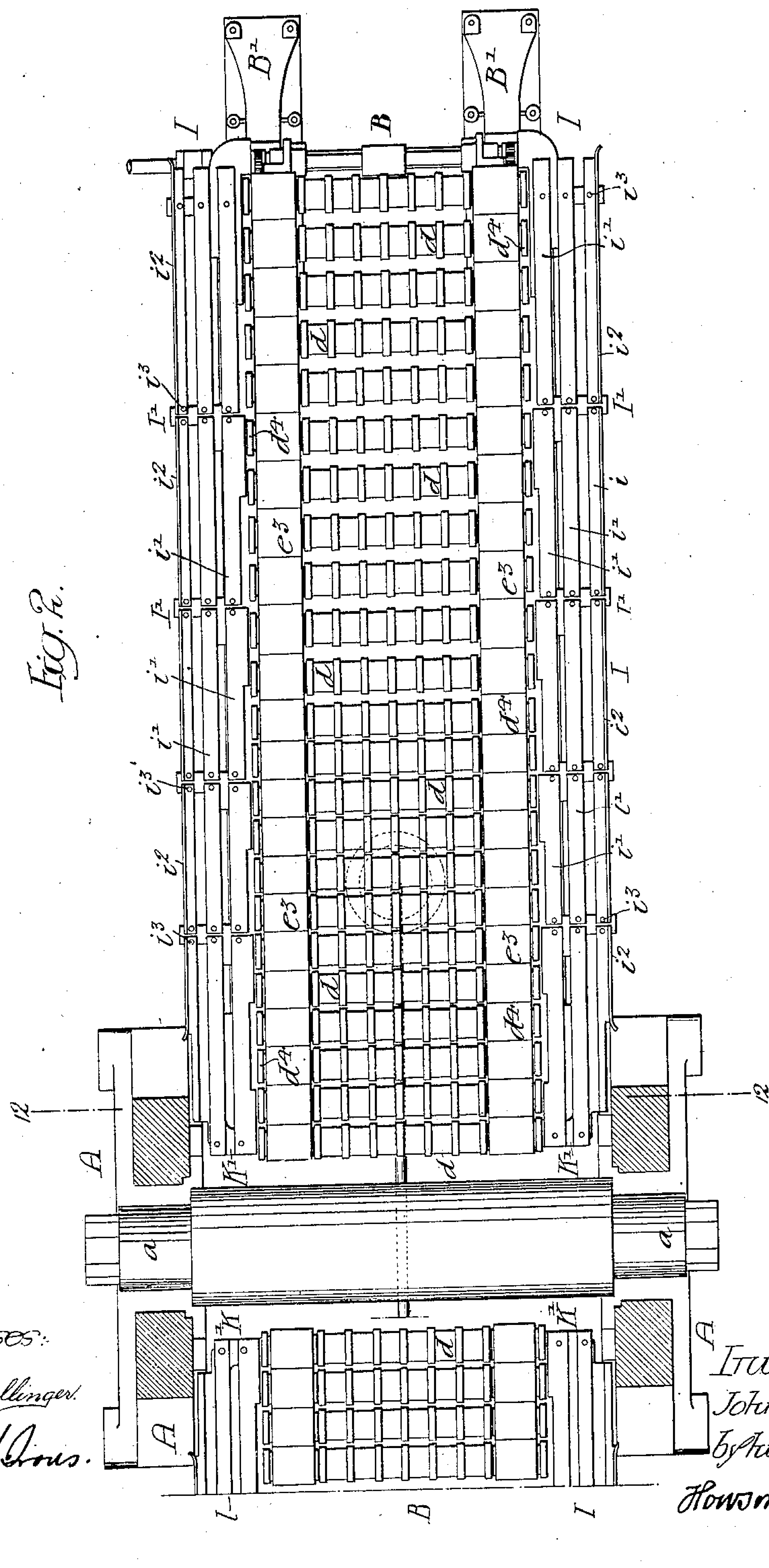
5 SHEETS—SHEET 2.



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J. S. WORTH.

ROLLING MILL TABLE.

APPLICATION FILED JULY 7, 1906

5 SHEETS—SHEET 3.

Fig. 3.

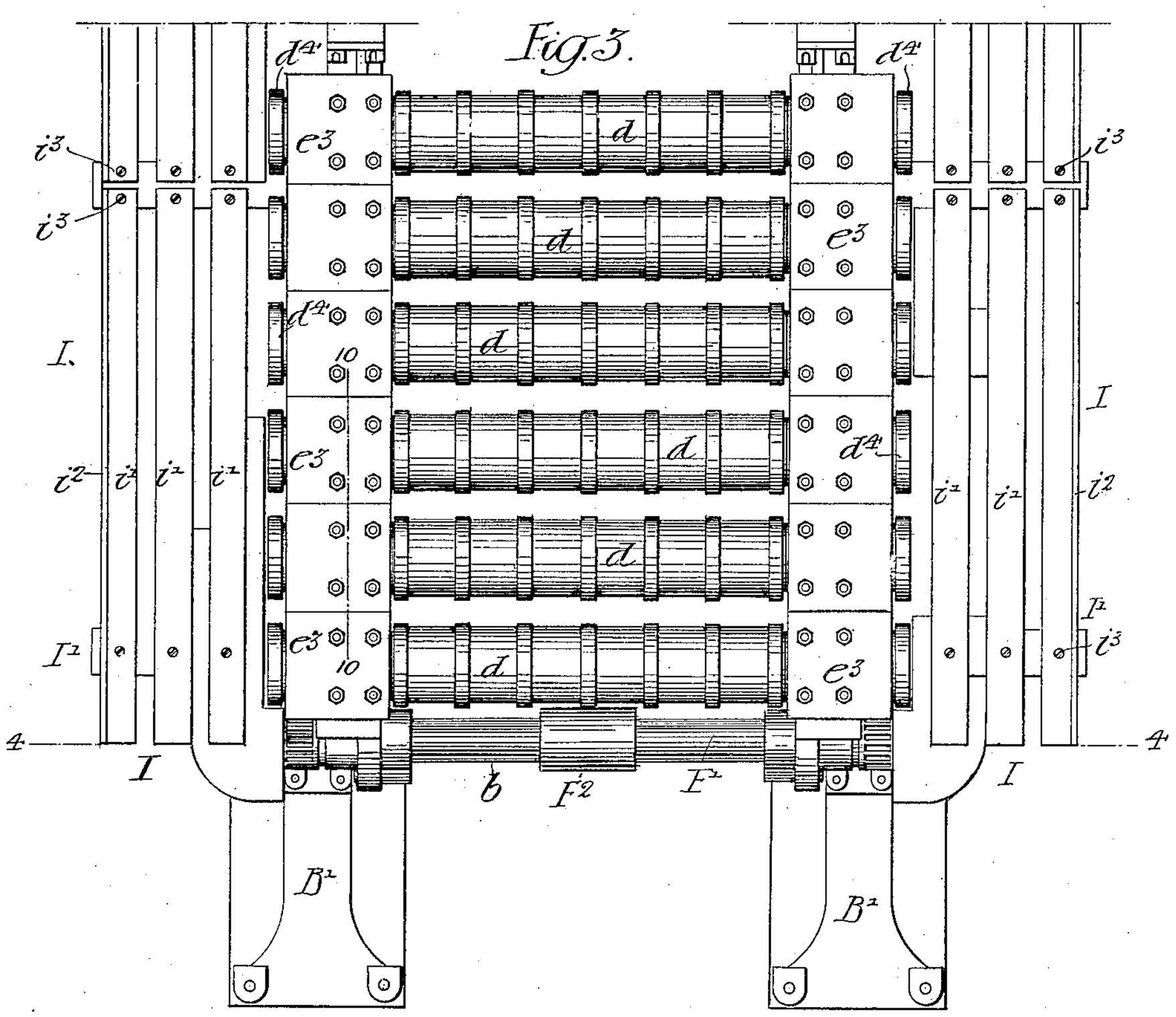
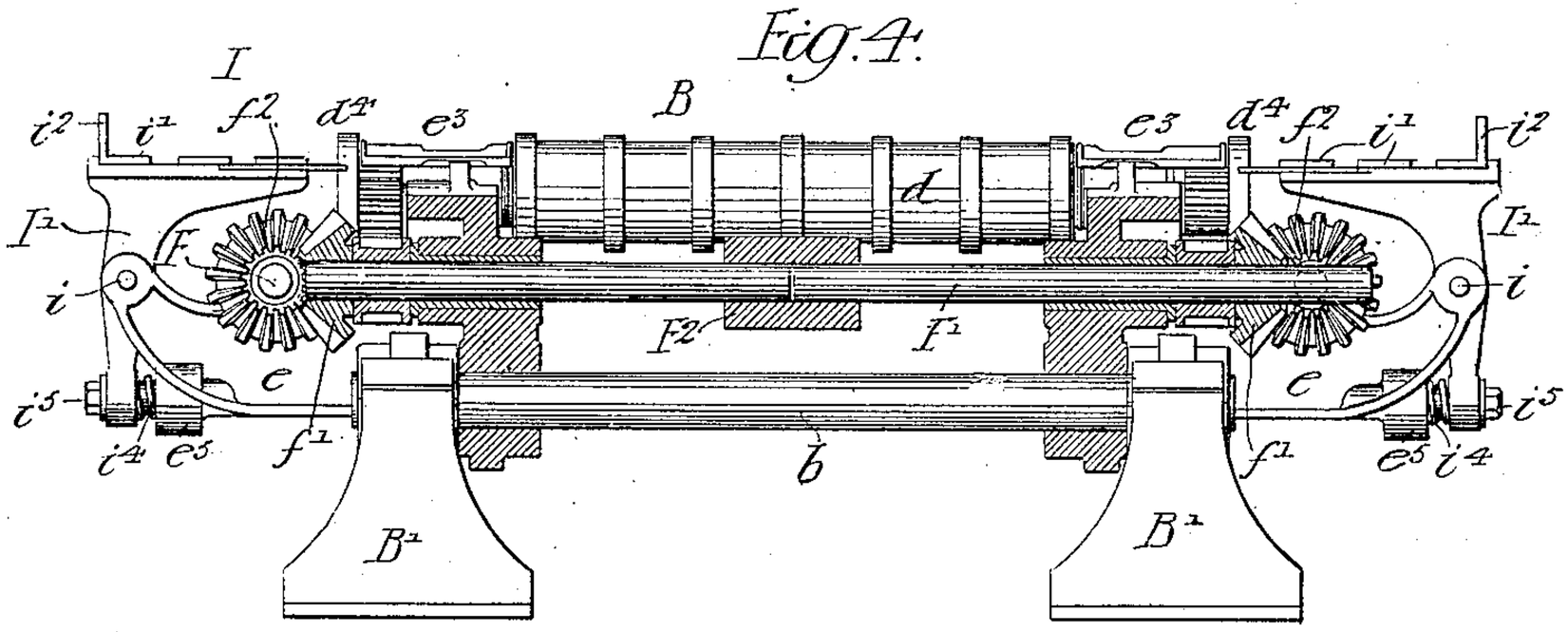


Fig. 4.



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No. 891,126. PATENTED JUNE 16, 1908.

J. S. WORTH.

ROLLING MILL TABLE.

APPLICATION FILED JULY 7, 1905. 5 SHEETS—SHEET 4.

Fig. 6.

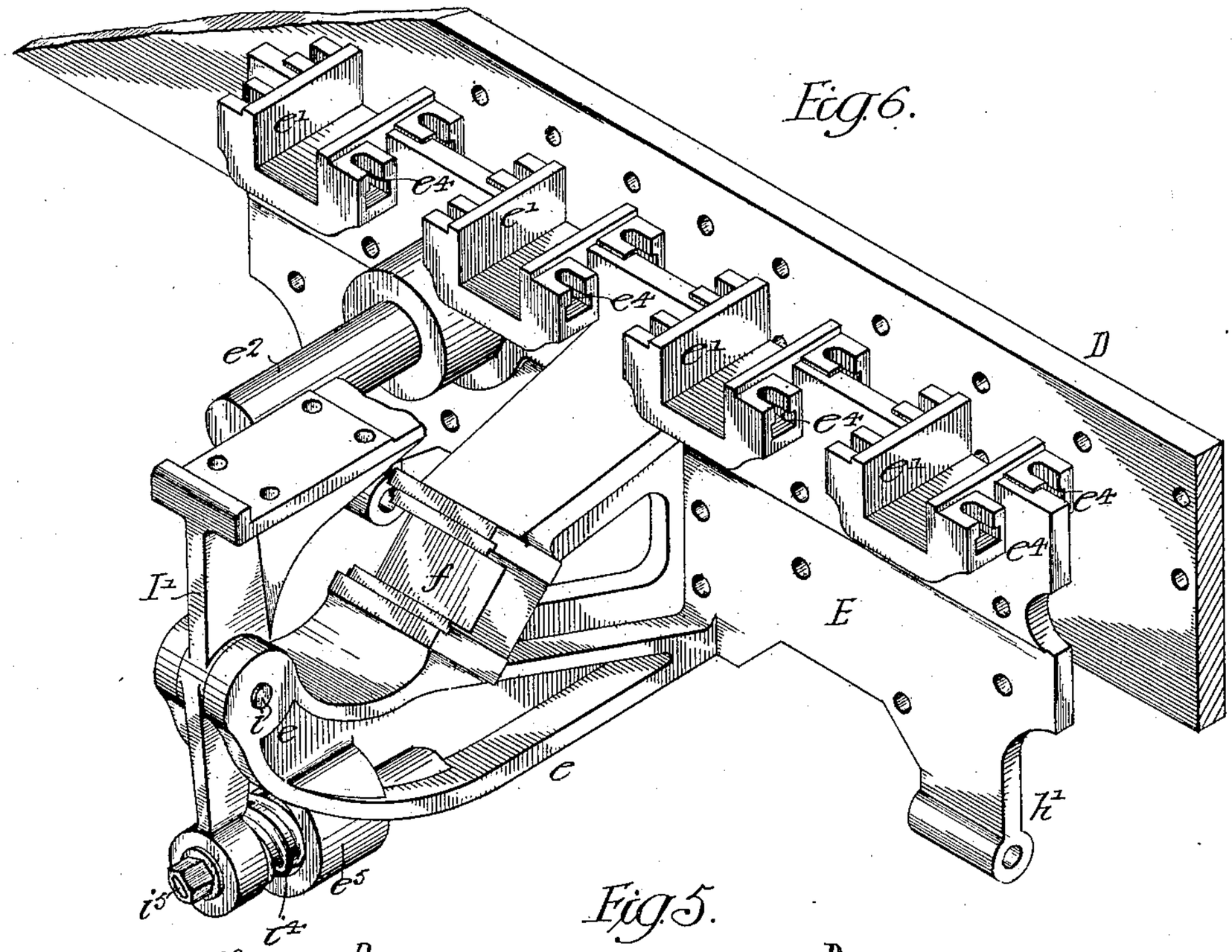
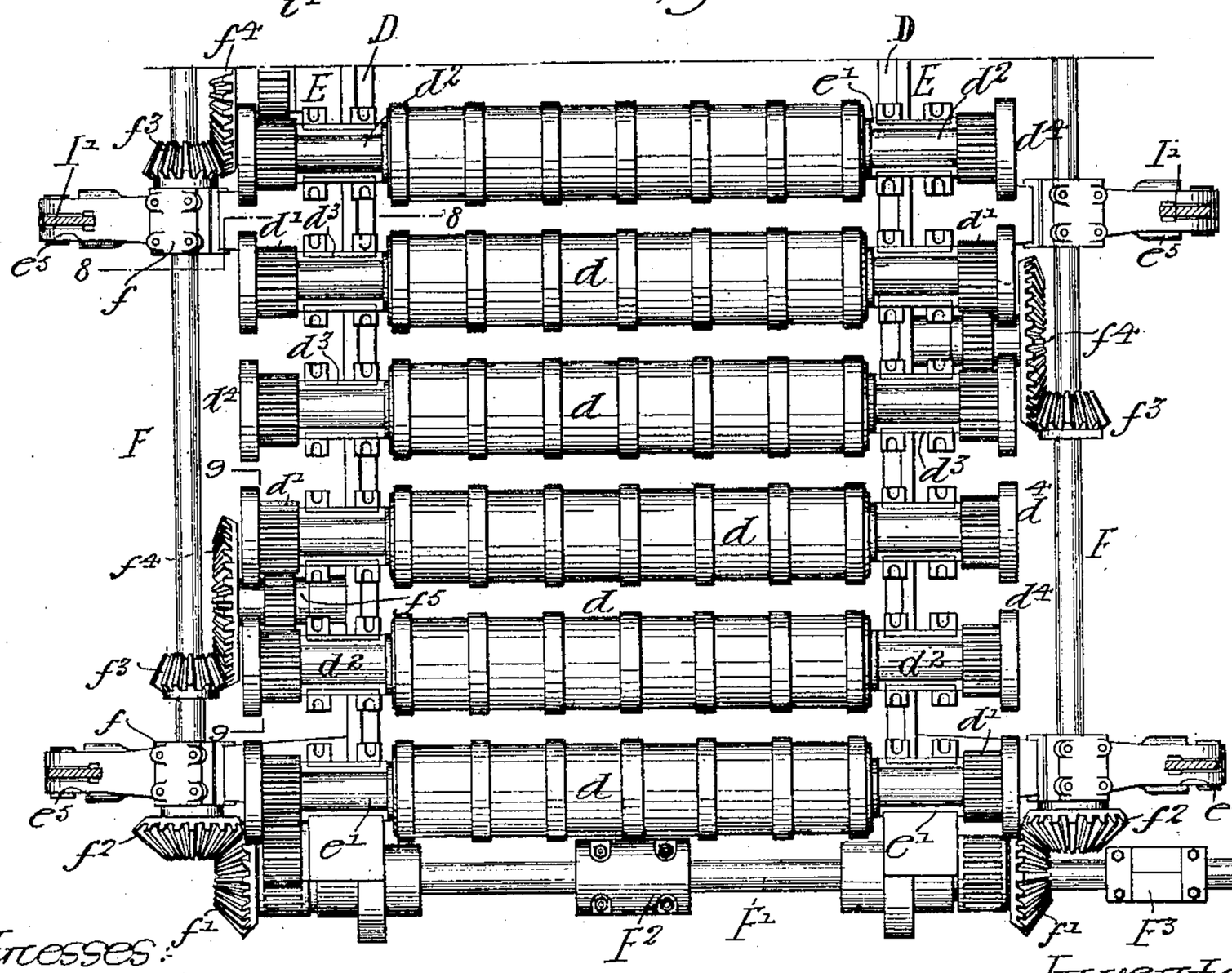


Fig. 5.



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No. 891,126. PATENTED JUNE 16, 1908.

J. S. WORTH.

ROLLING MILL TABLE.

APPLICATION FILED JULY 7, 1905. 6 SHEETS—SHEET 6.

Fig. 12.

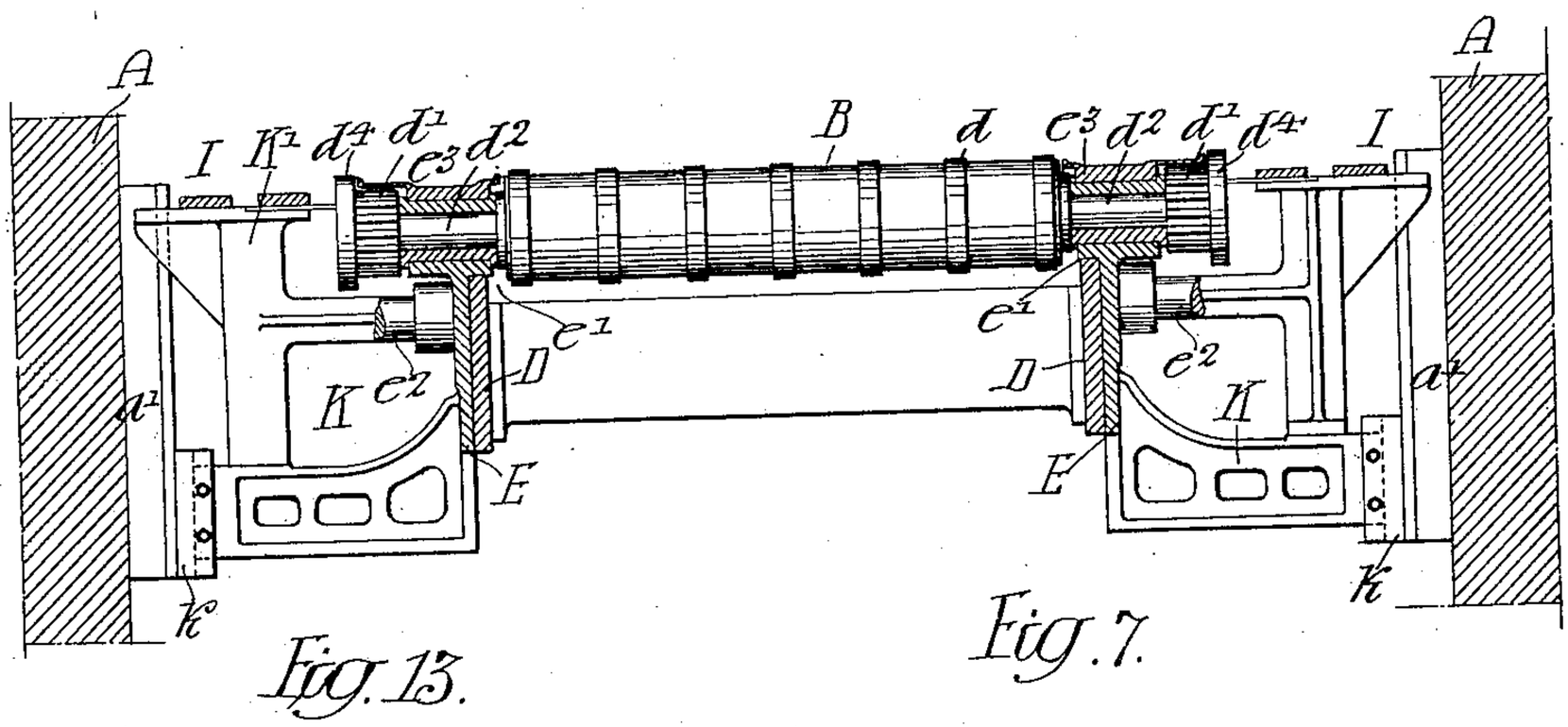
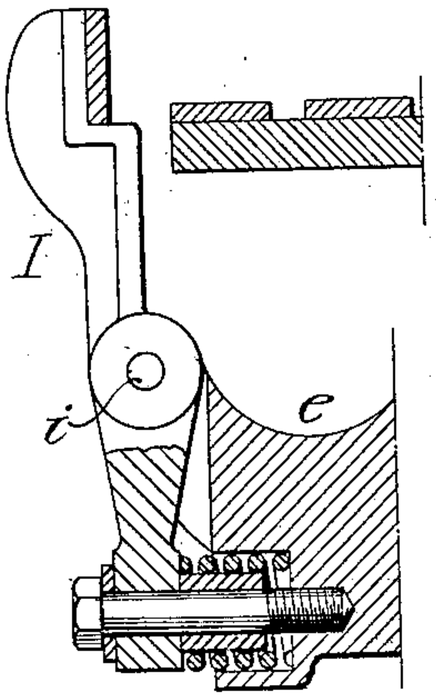


Fig. 13.

Fig. 7.



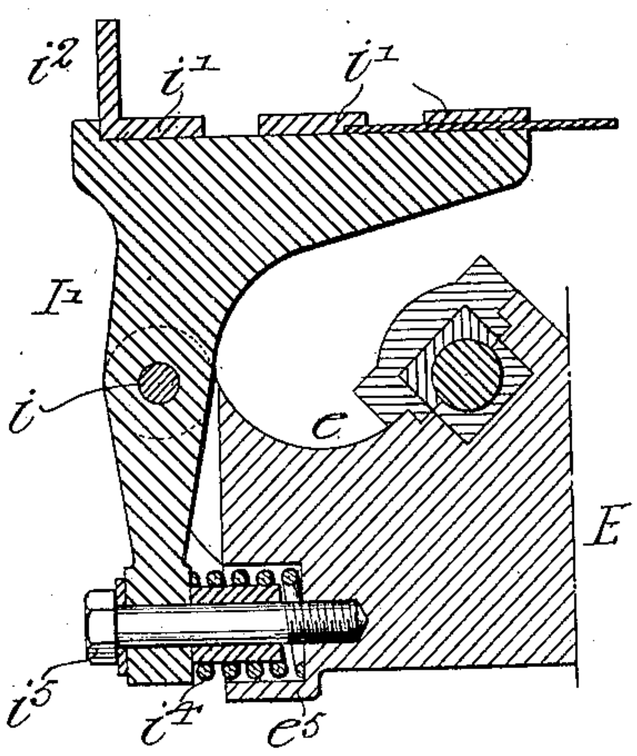


Fig. 11.

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Inventor:
John S. Worth.
by His Attorneys:
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UNITED STATES PATENT OFFICE.

JOHN S. WORTH, OF COATESVILLE, PENNSYLVANIA, ASSIGNOR TO HIMSELF AND WILLIAM P. WORTH, OF COATESVILLE, PENNSYLVANIA.

ROLLING-MILL TABLE.

No. 891,126. Specification of Letters Patent. Patented June 16, 1908.

Application filed July 7, 1905. Serial No. 268,619.

To all whom it may concern:

Be it known that I, JOHN S. WORTH, a citizen of the United States, and a resident of Coatesville, Chester county, Pennsylvania, have invented certain Improvements in Rolling-Mill Tables, of which the following is a specification.

My invention relates to certain improvements in pivoted tables which are situated at each side of a three high plate rolling mill.

The object of my invention is to so construct a table of this type that it can be easily operated, and to so devise the mechanism that any part can be removed for repairs without dismantling the entire table and a further object is to provide yielding side flanges at each side of the table. These objects I attain in the following manner, reference being had to the accompanying drawings, in which:

Figure 1, is a side view of my improved plate rolling-mill table; Fig. 2, is a plan view of the table shown in Fig. 1; Fig. 3, is an enlarged plan view of a portion of the table illustrated in Fig. 2; Fig. 4, is a section on the line 4—4, Fig. 3; Fig. 5, is a plan view partly in section, similar to Fig. 3, with the boxes removed; Fig. 6, is a detached perspective view of one of the bearing castings and one of the side plates to which the said castings are secured; Fig. 7, is a sectional view of one of the yielding guards illustrated in Fig. 4; Fig. 8, is a sectional view on the line 8—8, Fig. 5; Fig. 9, is a sectional view on the line 9—9, Fig. 5; Fig. 10, is a sectional view on the line 10—10, Fig. 3; Fig. 11, is a sectional view on the line 11—11, Fig. 9; Fig. 12, is a sectional view on the line 12—12, Fig. 2; and Fig. 13, is a view of a modification.

Referring to Figs. 1 and 2, A are the housings of a three high plate rolling-mill, a are the three rolls; B are the pivoted tables mounted at each side of the rolling-mill as indicated in Fig. 1, of the drawings. Each table is pivoted at its extreme rear end by a transverse pivot b to a foundation plate B′, and is operated by hydraulic pressure; in the present instance the fluid enters the cylinder C under the plunger c. This plunger is guided by a suitable head c', and resting in the end of the plunger is an arm c^2 coupled at c^3 to a bar c^4, pivoted at c^5 to the under side of the table B. Connected to the pin c^3 is a bell-crank lever C′, having an arm which is connected to a rod c^6 extending to the lifting mechanism of the table on the opposite side of the rolls. The lever C′, has an arm C^2 which carries a counterweight C^3, which aids the plunger in lifting the tables, as it will be understood that both tables are raised and lowered in unison, as the bloom or plate being rolled is first passed between the two lower rolls and returned between the two upper rolls. This lifting mechanism I lay no claim to, as it is old in the art.

Heretofore, it was deemed necessary to partly counterbalance the frame B by pivoting the frame some distance from the end, but this is objectionable owing to the fact that the rear end of the table is lower when in one position than the top of the fixed roller table; whereas, by pivoting it at the extreme end, as shown, the abutting edges of the two tables are always in line.

Extending the full length of the table on each side are plates D—D forming the main frame of the table. Attached to these plates are the castings E, each casting having bearing boxes e' for a certain number of rollers; in the present instance, all except the rear end castings have bearing boxes for four rollers each, while the rear end castings have bearing boxes for only three rollers.

While I have shown plain plates D to which the bearing castings E are secured, I may use a girder either in one piece or made up of a number of parts or two plates may be used on each side of the castings if desired depending upon the size of the table.

On each side of the table is a longitudinal driven shaft F mounted in boxes f on brackets e projecting from the castings E. These shafts F are driven in unison from a transverse driving shaft F′ coupled to any source of power. Said driving shaft in the present instance is situated directly above the pivot b of the table. On each end of the driving shaft F′ is a beveled gear wheel f' which meshes with a beveled gear wheel f^2 on the end of each shaft F. On each shaft F are beveled pinions f^3 which mesh with beveled wheels f^4, mounted on studs e^2 projecting from the bearing castings E, Figs. 9 and 11. On the hub of the beveled wheel f^4 is a gear wheel f^5, which meshes with the pinions d' on the spindles of the rollers d, so that it will be seen the rollers are driven in pairs. By driving the rolls from each side, I am enabled to increase the power without abnormally increasing the shafts as the power is

divided between the two shafts and room is provided for the bearings, further in the event of a break down, on one side the alternate sets of rolls can still be driven from the opposite side.

By gearing the rollers indirectly as shown, the side shafts are mounted considerably below the upper surface of the table, and by removing one of the side shafts all the bevel wheels on that side of the table can be readily removed if desired.

Referring to Figs. 1 and 5, it will be noticed that the rollers are driven in pairs from opposite sides, one set of rollers being driven from one side of the table and the alternate set from the opposite side, thus dispensing with the long train of gears on one side only of the table.

As shown in Fig. 5, the rollers are made with spindles d^2 projecting from each end which are mounted in bearings d^3 carried by the boxes e'. At each end of each spindle is a gear wheel d', although only one of the gears transmits power. The idea of providing an extra gear on the opposite end of the spindle from where the power is applied is to make repairs quickly in the case of an accident to the driving gear by simply detaching the boxes and turning the rollers end for end.

At each end of each spindle is a supporting disk d^4, which is of the same diameter as the ribs on the roller d, so that the plate or bloom as it passes onto or off the table will be supported by the ribs of the rollers and the supporting disks, and be clear of the cover plates e^3 of the boxes which contain the bearings for the spindles of the rollers d. These boxes not only fit over the bearings but project over the gear wheels d' and fit close against the ends of the rollers so that there will be very little chance of scale reaching the bearings or the gears. The heads of the bolts securing the covers in place are placed in T-headed slots e^4 in the casting E and project through the cover plates e^3, the cover plates fit tightly one against another so as to form a continuous protecting surface above the bearings and gears, suitable oil holes are provided, which are not shown in the drawings.

As the driving shaft F′ is off to one side of the pivot of the table, I connect it by a toggle coupling F^3 with the power shaft fixed in bearings at one side of the table, so that the table can be raised and lowered without interfering with the mechanism for driving the table rollers. Driving through the pivot is objectionable for many reasons.

I preferably make the driving shaft F′ in two parts, and couple the two parts by a coupling F^2. By this construction if it is desired to move one or other portions of the shaft, this can be readily accomplished without dismantling the table. All the gearing is so constructed that if any part should become disarranged or broken, that particular part can be readily removed.

I are frames at each side of the table for supporting the overhanging portions of a plate being rolled, these frames are carried in the present instance by a series of levers I′ pivoted at i to extensions of the brackets e projecting from the castings E.

The frames consist of slats i' which are pivoted at each end to the levers I′, a flange i^2 on the outer edge of each frame I is carried by the levers I′ and act as lateral stops for the bloom or plate being rolled should it veer to one side or the other. The flange i^2 extends preferably to a point in close proximity to the housings of the rolls, and preferably in line with the housings. The levers I′ are so mounted that they will yield when a plate comes in contact with the flange i^2.

Each slat i' is secured to each lever I′ by a single bolt or other fastening i^3, so that in the event of the plate striking a flange of a certain section, it will be free to yield without tearing the slats from the levers. Between the depending arm of each lever I′ and a socket e^5 is a spring i^4, and in order to limit the outward movement of the arm or lever I′, and to adjust the side flanges in respect to the housings, I provide a bolt i^5, which passes through an opening in the arm of the lever I′ through the spring i^4 and is tapped into the bracket e as clearly indicated in Fig. 7, so that the action of the spring tends to force the arm of the lever against the head of the bolt and keep the frame I rigid under ordinary conditions, but should a plate strike a flange i^2, then the spring will yield sufficiently to absorb the shock and prevent the breaking or bending of the flange, and will tend in some instances to push the plate within the line of the housing so that it can be fed properly between the rolls.

While I have shown the flange on the side frame and the entire frame made yielding, I may in some instances, make the frames rigid and the flanges only yielding as shown in Fig. 13.

In assembling the machine, the castings E are mounted on the frame plates D, and in order to attach them readily one to the other, I preferably provide tie-bolts h which pass through openings in the lugs h' on the frames E as clearly shown in Fig. 1, thus the frames are not only secured to the frame plates, but are also rigidly secured together, making a strong and substantial framework for the table; yet, at the same time, in the event of an accidental breaking of one of the castings, the particular casting can be readily removed and a new one can very readily be substituted therefor.

In order to keep the pivoted table in line with the housings A, I secure to each side of the frame of the table B brackets K which extend below the frame and each bracket has

a detachable shoe *k* which bears against a rub plate *a'* on the housing, and secured to the bracket K is a support K' for the ends of the slats *i'* as clearly shown in Figs. 2 and 12.

I claim as my invention:

1. The combination in a rolling mill table, of a longitudinal side plate, frames secured to said side plate adapted to receive bearings for rollers, and means for securing said frames together end to end independently of the plate, substantially as described.

2. The combination in a rolling mill table, of a longitudinal side plate, frames secured to said side plate adapted to receive bearings for rollers, lugs on each frame, and longitudinal bolts passing through the lugs and securing the adjacent frames together end to end, substantially as described.

3. The combination of a frame at each side of the table, bearings thereon, a series of rollers carried by the frame, gearing by which the rollers are driven, a series of cap plates mounted upon the bearings and extending over the gearing, said cap plates at each side abutting each other, forming a continuous protection for the bearings and gearing, substantially as described.

4. The combination in a rolling mill table, of a frame, bearings mounted on the said frame, rollers having spindles mounted in the bearings and a transverse driving shaft at one end of the table, a driven shaft at each side of the table, gearing between the said driven shafts and the driving shaft, a series of gear wheels on each side of the table, pinions on the spindles of each roller, each of said wheels meshing with the pinions on two of the rollers, gearing by which said wheels are driven from the driven shafts at the side of the table, the said gearing being so arranged that the alternate sets of pairs of rollers are driven from one side of the table and the others are driven from the opposite side of the table, substantially as described.

5. The combination in a rolling mill table, of longitudinal frames, rollers mounted in bearings in the frames, a longitudinal shaft at one side of the table, side members having a flange extending above the surface of the table, brackets on the frame to which the side members are pivoted, and yielding means for retaining the flange of the side members in its normal position, substantially as described.

6. The combination in a rolling mill table, of a side plate, a series of bearing castings secured to the plate, rollers mounted in the bearing, brackets projecting from the casting, and a yielding side flange carried by the brackets, substantially as described.

7. The combination in a rolling mill table, of a frame, rollers mounted on the frame, a side frame at each side of the table, each of said frames having a flange extending above the upper surface of the rollers, said side frames being made in sections, and means whereby the frame will yield, substantially as described.

8. The combination in a rolling mill table, of frames, rollers mounted thereon, brackets projecting from each frame, a series of levers pivoted to the several brackets, yielding means for retaining the levers in their normal position, and side flanges carried by the levers, substantially as described.

9. The combination in a rolling mill table, of a frame, rollers mounted on the frame, brackets projecting from the frame, levers pivoted to the brackets, side flanges carried by the levers, and yielding means for retaining the side flanges in their normal position, substantially as described.

10. The combination in a rolling mill table, of a frame, rollers thereon, a series of brackets projecting from the frame, a series of levers pivoted to the brackets, the upper arm of each lever carrying a side frame with a flange at the outer edge, said flange projecting above the upper surface of said rollers, with a spring mounted between the lower arm of each lever and the frame of the table, with a stop to limit the outward movement of the lower arm, substantially as described.

11. The combination in a rolling mill table, of a frame, a series of rollers carried by the frame, side frames at each side of the table, a flange on the outer edge of each frame, said flange extending above the upper surface of the rollers, means for allowing the said side frames to yield, each of said side frames made up of slats extending from one supporting means to another and pivotally connected to the supporting means, substantially as described.

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

JOHN S. WORTH.

Witnesses:

WALTER CHISM,

JOS. H. KLEIN.