March 21, 1950 J. B. PICTON ET AL 2,501,087

STRAIGHTENING MACHINE

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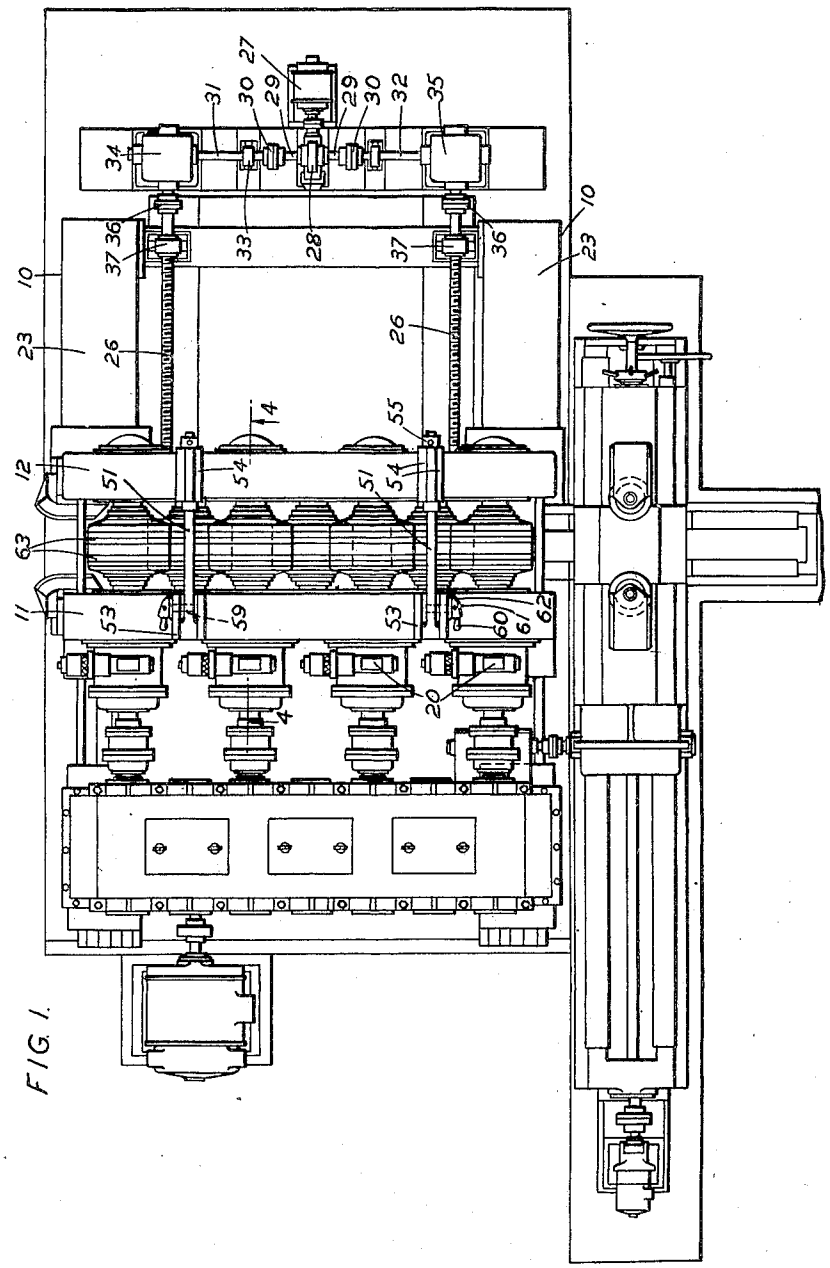


FIG. 1.

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FIG. 2.

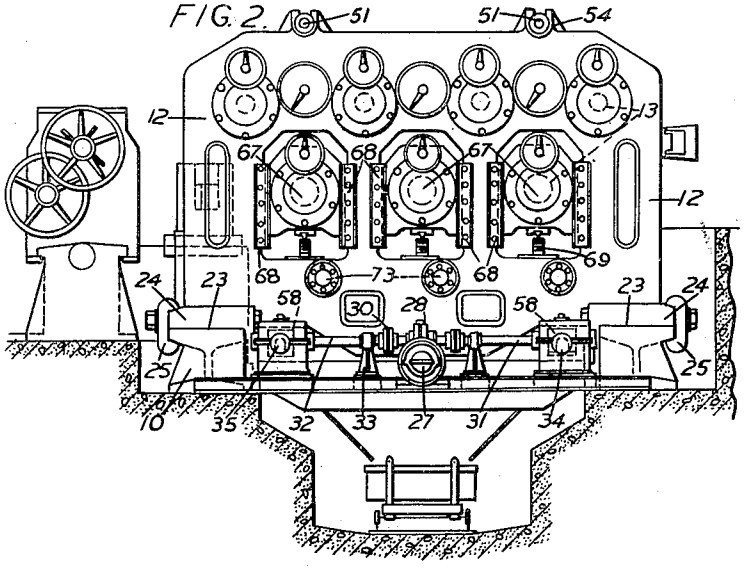
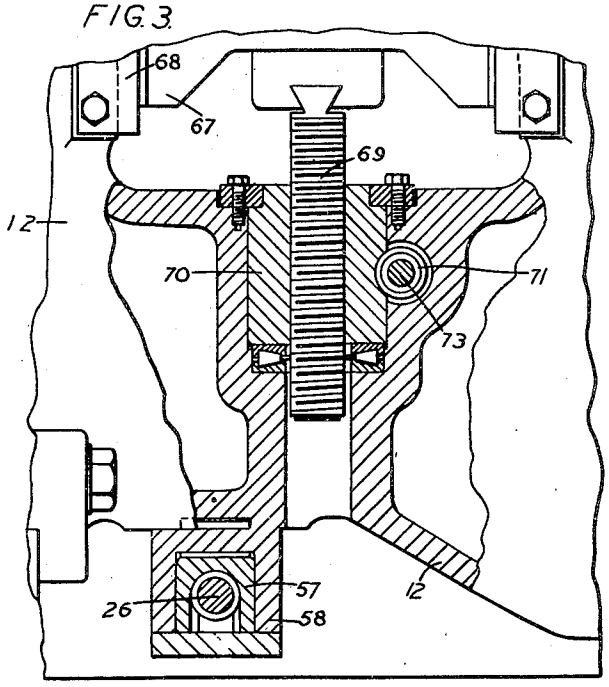


FIG. 3.



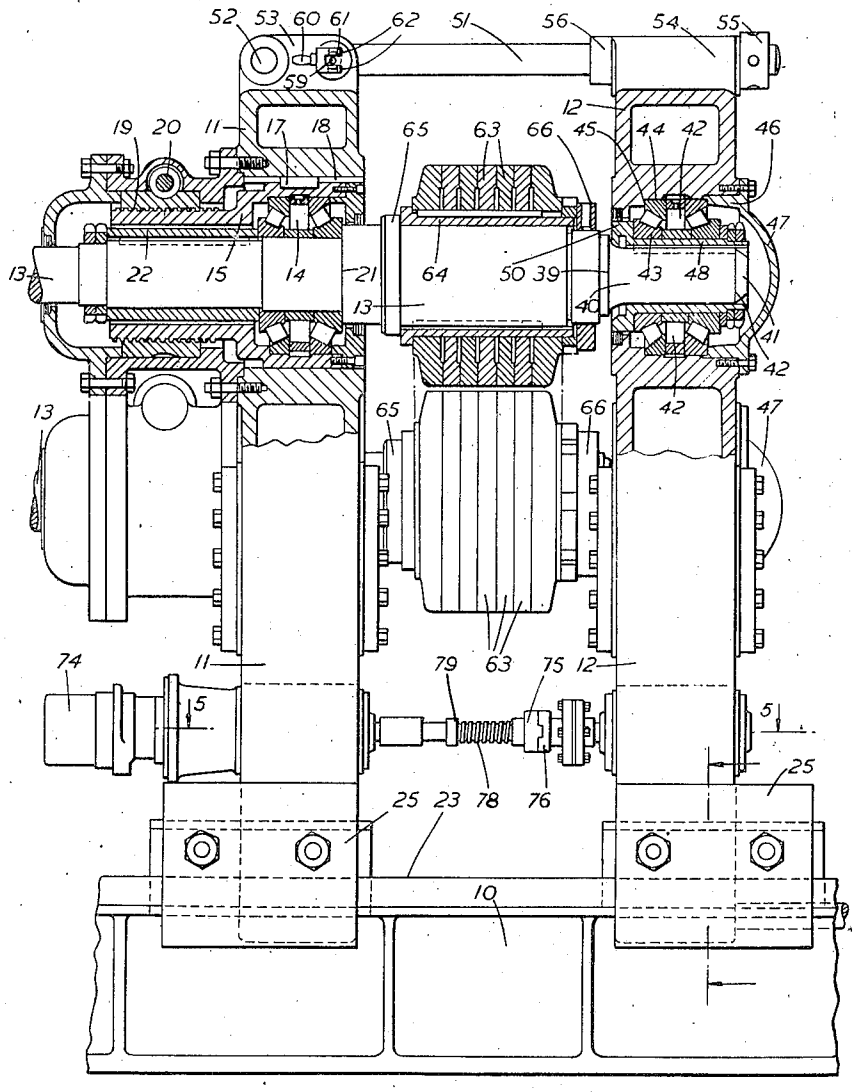
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FIG. 4.



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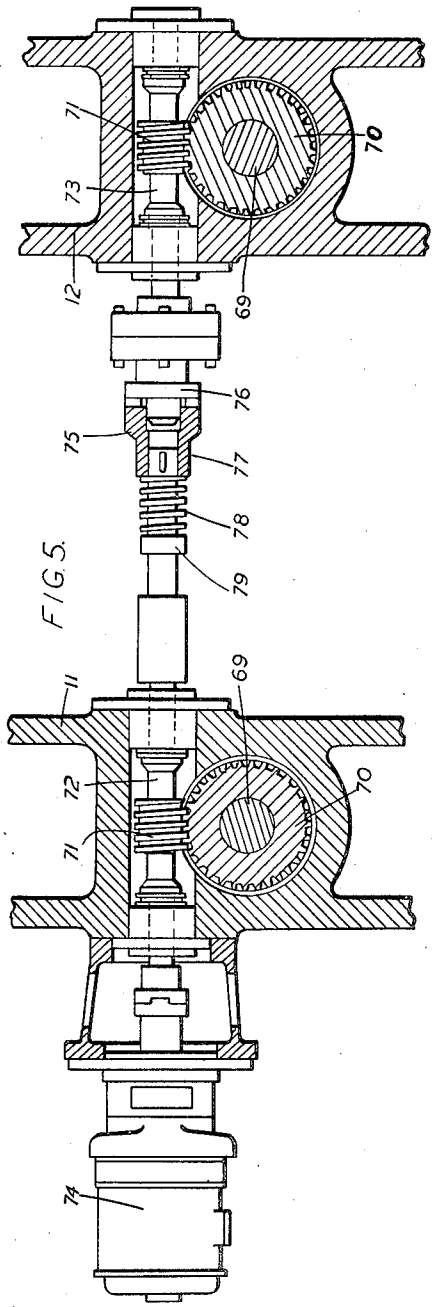


FIG. 5.

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UNITED STATES PATENT OFFICE

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STRAIGHTENING MACHINE

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Patent expires October 9, 1965

7 Claims. (Cl. 153—54)

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This invention relates to straightening machines and refers more particularly to machines of the kind used for straightening rolled sections or other elements, and wherein the members to be straightened are passed between two groups of straightening rolls usually arranged on parallel axes, the rolls of one group being staggered in relation to the rolls of the other group, and being so disposed that the members are straightened as they pass between the two groups.

The object of the present invention is to provide an improved construction whereby the operation of roll changing, which is necessary for treating various shapes and sizes of elements, can be effected in less time and with less expenditure of power than hitherto.

According to the present invention the roll carrying shafts are supported at their ends in spaced housings, and one of these housings is movably mounted on the machine bed and means are provided to enable it to be moved away from the other housing in a direction parallel to the axes of the roll shafts so as to leave the roll shafts and the rolls thereon supported by the other housing and to enable the rolls to be withdrawn from the ends of their shafts for roll changing.

The means for moving the movable housing may consist of power-driven screw-and-nut mechanism.

Means are preferably provided for locking the two housings together during the working periods of the machine, and such means may take the form of one or more ties hinged to one housing and adapted to engage detachably with the other housing.

The bearings for those ends of the roll shafts over which the rolls are withdrawn when changing are preferably carried by the movable housing and move therewith, and these ends of the roll shafts are preferably tapered for easy engagement with the bearings when the movable housing is replaced after roll changing.

The rolls may be built up in the known way on a number of separate discs mounted on a sleeve and retained against a shoulder on the roll shaft by means of a nut, and the sleeve is thus readily detachable from the shaft together with the roll.

The invention is illustrated in the accompanying drawings wherein:

Figure 1 is a plan view.

Figure 2 is a view in side elevation.

Figure 3 is a sectional view in side elevation and on an enlarged scale showing the means for

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raising and lowering the shafts of the lower set of rollers.

Figure 4 is a part section on line 4—4 of Figure 1.

Figure 5 is a section on line 5—5 of Figure 4.

In the construction illustrated, the machine comprises a bed 10 upon which are mounted two spaced housings, a primary housing 11, and a secondary housing 12 supporting the two groups of parallel roll shafts 13 which may be arranged horizontally. Means may be provided in one of the housings so that the roll shafts can be adjusted in an endwise direction by a predetermined amount. Such means may incorporate a bearing 14 in which a part of the shaft 13 is mounted, the outer part of this bearing being carried by a sleeve 15 which can move axially but is prevented from rotation by a key 17 engaging a keyway 18 provided in the primary housing 11. The sleeve 15 is engaged by an adjusting nut 19 operated by a worm 20 and the arrangement is such that when the worm is rotated the nut rotates on the screwed sleeve and moves it in an endwise direction, this motion being transmitted to the shaft 13 by the inner part of the bearing 14 which engages between a shoulder 21 on the shaft and a sleeve 22 secured to the shaft.

Both of the housings 11 and 12 are mounted upon horizontal guides 23 formed on the machine bed 10, these guides being parallel and disposed at opposite sides of the bed. The base of each housing is provided with slides 24 of angle section for engaging these guides and clips 25 are provided for locking the housings to the bed in various adjusted positions.

Both housings are provided with bearings, preferably of the roller type, for supporting the roll shafts 13, and the secondary housing 12 is slidably mounted upon the machine bed, two parallel screws 26 being provided for this purpose engaging with saddle nuts 57 in pockets 58 in the secondary housing 12, and power means being provided for operating these screws simultaneously. The said power means includes a power unit 27 driving through worm gear 28, a transverse shaft 29 coupled at its ends by couplings 30 to shafts 31 and 32 supported in bearings 33. The shafts 31 and 32 are coupled by bevel gearing within casings 34 to shafts 35 connected by couplings 36 to the screws 26 which are rotatably mounted in bearings 37 on the bed.

The end portion 38 of each roll shaft 13 which engages the movable housing 12 is shouldered at 39 and has a parallel part 40 which terminates in a short tapered part 41, and the bearings 42

carried by the movable housing 12 are retained in the housing when the housing is moved away to uncover one end of each roll shaft. Each of these bearings 42 has an inner rotating element 43 and an outer stationary element 44. The stationary element engages at one side a shoulder 45 in the housing 12 and is engaged at the opposite side by a rim 46 on a cap 47 screwed to the housing 12. The inner element of the bearing 42 is mounted on a sleeve 48 having nuts 49 at one end of which it is locked to the said inner bearing element, the sleeve 48 having a flange 50 at the opposite end which engages the opposite end of the inner bearing element.

The two housings are locked together by a pair of ties while the machine is working, and these ties consist of bars 51 which are hinged at 52 to spaced lugs 53 on the top of the primary housing 11, the bars 51 engaging between pairs of lugs 54 on the top of the secondary housing 12, nuts 55 being provided for locking the bars to this second housing which is the movable housing. The bars are provided with external flanges 56 for engaging the inner end faces of the lugs 54.

Bolts 59 are provided in the lugs 53 to which the tie bars 51 are pivoted, and these bolts may be operable by levers 60 pivoted to the bolts at 61, the said levers having noses 62 which can be turned to engage the sides of the lugs 53 for withdrawing the bolts from the recesses in the sides of the tie bars 51.

Each of the rolls is made as a plurality of discs 63 mounted on a sleeve 64 engaging a roll shaft 13 between a flange 65 and a removable locking collar 66.

The roll shaft 13 of each of the lower set of rollers is vertically adjustable by mounting it in slides 67 engaging vertical guides 68 and by providing a vertical adjusting screw 69 for each of these slides. Each adjusting screw 69 is provided in a sleeve nut 70 which can be turned in a bearing in the housings 11 and 12 by means of worms 71 mounted upon worm shafts 72, 73. One of these shafts is positively driven by a power unit 74 and the two shafts are releasably coupled together by a coupling shown at 75 and incorporating a flange 76 on one shaft provided with dog teeth and a sliding sleeve 77 on the other shaft also provided with dog teeth. The sleeve 77 is acted upon by a spring 78 engaging a collar 79 to keep the teeth in engagement and a suitable stop is provided to prevent the sleeve from leaving the shaft when this coupling is released. One end of the shaft 73 is provided with an extension which engages in the end of the sleeve on the shaft 72.

When it is desired to change rolls the ties 51 are first released by slackening the nuts 55 at their ends and then withdrawing the bolts 59 as above described. When this has been done the ties can be turned upwardly so that the movable housing is released and the ties may be retained in the said upward position by advancing the bolts 59, the noses of which pass beneath the raised tie bars.

The couplings connecting the shafts 72, 73 are then released.

The screws 26 can then be operated which move the movable housing 12, and this is done after clamping means which clamp the foot of the movable housing to the guides on the bed of the machine have been released.

What we claim then is:

1. A machine for straightening rolled sections or other elements comprising a machine bed, spaced primary and secondary housings mounted on the bed, the secondary housing being slidable on the bed towards and away from the primary housing, means for sliding the secondary housing along said bed, means for clamping the secondary housing to the bed in various adjusted positions thereon, said primary and secondary housings having alined openings, sleeves in the openings of the primary housing, means preventing rotary movement of said sleeves, means on said primary housing for moving said sleeves axially, bearings in said sleeves, means causing said bearings to partake of the axial movements of said sleeves, a roll shaft having one end portion mounted in each of said bearings, said roll shaft having a shoulder engaging one end of the bearing, and having a sleeve engaging the other end of said bearing, a flange on that part of the roll shaft which is disposed between the housings, a sleeve on said roll shaft engaging the flange, a locking collar on the roll shaft engaging the other end of said sleeve, a roll mounted on each of said sleeves on the roll shafts, and bearings in each of the openings in the secondary housing, the other ends of the roll shafts engaging in said bearings, the bearings in the secondary housing moving with the secondary housing when it is moved along the bed so as to disengage from the roll shafts and allow the rolls to be removed from the roll shafts.

2. A machine for straightening rolled sections or other elements comprising a machine bed, spaced primary and secondary housings mounted on the bed, the secondary housing being slidable on the bed towards and away from the primary housing, means for sliding the secondary housing along said bed, means for clamping the secondary housing to the bed in various adjusted positions thereon, said primary and secondary housings having alined openings, sleeves in the openings of the primary housing, means preventing rotary movement of said sleeves, means on said primary housing for moving said sleeves axially, said means comprising nuts in the housing mounted so that they can rotate but cannot move axially, said nuts engaging external threads on the sleeves, and worms in the housing engaging worm teeth on the nuts, bearings in said sleeves, means causing said bearings to partake of the axial movements of said sleeves, a roll shaft having one end portion mounted in each of said bearings, said roll shaft having a shoulder engaging one end of the bearing, and having a sleeve engaging the other end of said bearing, a flange on that part of the roll shaft which is disposed between the housings, a sleeve on said roll shaft engaging the flange, a locking collar on the roll shaft engaging the other end of said sleeve, a roll mounted on each of said sleeves on the roll shafts, and bearings in each of the openings in the secondary housing, the other ends of the roll shafts engaging in said bearings, the bearings in the secondary housing moving with the secondary housing when it is moved along the bed so as to disengage from the roll shafts and allow the rolls to be removed from the roll shafts.

3. A machine for straightening rolled sections or other elements comprising a machine bed, spaced primary and secondary housings mounted on the bed, the secondary housing being slidable on the bed towards and away from the primary housing, means for sliding the secondary housing along said bed, means for clamping the secondary housing to the bed in various adjusted

positions thereon, said primary and secondary housings having alined openings, sleeves in the openings of the primary housing, means preventing rotary movement of said sleeves, means on said primary housing for moving said sleeves axially, bearings in said sleeves, means causing said bearings to partake of the axial movements of said sleeves, a roll shaft having one end portion mounted in each of said bearings, said roll shaft having a shoulder engaging one end of the bearing, and having a sleeve engaging the other end of said bearing, a flange on that part of the roll shaft which is disposed between the housings, a sleeve on said roll shaft engaging the flange, a locking collar on the roll shaft engaging the other end of said sleeve, a roll mounted on each of said sleeves on the roll shafts, and bearings in each of the openings in the secondary housing, each of said bearings having an outer element engaging means in the opening of the housing which prevent the element from making axial movements, and each of said bearings having a rotary inner element in which is mounted a bearing sleeve locked against axial movement relatively to the bearing, the other ends of the roll shafts engaging in and being supported by said bearing sleeves, and the bearings in the secondary housing moving with the secondary housing when it is moved along the bed so as to disengage from the roll shafts and allow the rolls to be removed from the roll shafts.

4. A machine for straightening rolled sections or other elements comprising a machine bed, spaced primary and secondary housings mounted on the bed, the secondary housing being slidable on the bed towards and away from the primary housing, means for sliding the secondary housing along said bed, means for clamping the secondary housing to the bed in various adjusted positions thereon, said primary and secondary housings having alined openings, sleeves in the openings of the primary housing, means preventing rotary movement of said sleeves, means on said primary housing for moving said sleeves axially, bearings in said sleeves, means causing said bearings to partake of the axial movements of said sleeves, a roll shaft having one end portion mounted in each of said bearings, said roll shaft having a shoulder engaging one end of the bearing, and having a sleeve engaging the other end of said bearing, a flange on that part of the roll shaft which is disposed between the housings, a sleeve on said roll shaft engaging the flange, a locking collar on the roll shaft engaging the other end of said sleeve, a roll mounted on each of said sleeves on the roll shafts, bearings in each of the openings in the secondary housing, the other ends of the roll shafts engaging in said bearings, the bearings in the secondary housing moving with the secondary housing when it is moved along the bed so as to disengage from the roll shafts and allow the rolls to be removed from the roll shafts, a pair of lugs on the top of the primary housing, a pair of lugs on the top of the secondary housing, a tie bar pivoted to the lugs on the primary housing, said tie bar having a shoulder for engaging one pair of ends of the lugs on the secondary housing, nuts on the ends of the tie bars for engaging the other pair of ends of the lugs on the secondary housing.

5. A machine for straightening rolled sections or other elements comprising a machine bed, spaced primary and secondary housings mounted on the bed, the secondary housing being slidable on the bed towards and away from the primary

housing, means for sliding the secondary housing along said bed, means for clamping the secondary housing to the bed in various adjusted positions thereon, said primary and secondary housings having alined openings, sleeves in the openings of the primary housing, means preventing rotary movement of said sleeves, means on said primary housing for moving said sleeves axially, bearings in said sleeves, means causing said bearings to partake of the axial movements of said sleeves, a roll shaft having one end portion mounted in each of said bearings, said roll shaft having a shoulder engaging one end of the bearing, and having a sleeve engaging the other end of said bearing, a flange on that part of the roll shaft which is disposed between the housings, a sleeve on said roll shaft engaging the flange, a locking collar on the roll shaft engaging the other end of said sleeve, a roll mounted on each of said sleeves on the roll shafts, bearings in each of the openings in the secondary housing, the other ends of the roll shafts engaging in said bearings, the bearings in the secondary housing moving with the secondary housing when it is moved along the bed so as to disengage from the roll shafts and allow the rolls to be removed from the roll shafts, a pair of lugs on the top of the primary housing, a pair of lugs on the top of the secondary housing, a tie bar pivoted to the legs on the primary housing, said tie bar having a shoulder for engaging one pair of ends of the lugs on the secondary housing, nuts on the ends of the tie bars for engaging the other pair of ends of the lugs on the secondary housing, a bolt in the lugs on the primary housing, and a lever on the bolt for operating it, said bolt being movable into a position in which it supports the tie bar in a raised position after it has been released from the lugs on the secondary housing.

6. A machine for straightening rolled sections or other elements comprising a machine bed, spaced primary and secondary housings mounted on the bed, the secondary housing being slidable on the bed towards and away from the primary housing, means for sliding the secondary housing along said bed, said means comprising bearings on the bed, power driven screws in said bearings, saddle nuts in pockets in the secondary housing engaged by said screws, means for clamping the secondary housing to the bed in various adjusted positions thereon, said primary and secondary housings having alined openings, sleeves in the openings of the primary housing, means preventing rotary movement of said sleeves, means on said primary housing for moving said sleeves axially, bearings in said sleeves, means causing said bearings to partake of the axial movements of said sleeves, a roll shaft having one end portion mounted in each of said bearings, said roll shaft having a shoulder engaging one end of the bearing, and having a sleeve engaging the other end of said bearing, a flange on that part of the roll shaft which is disposed between the housings, a sleeve on said roll shaft engaging the flange, a locking collar on the roll shaft engaging the other end of said sleeve, a roll mounted on each of said sleeves on the roll shafts, and bearings in each of the openings in the secondary housing, the other ends of the roll shafts engaging in said bearings, the bearings in the secondary housing moving with the secondary housing when it is moved along the bed so as to disengage from the roll shafts and allow the rolls to be removed from the roll shafts.

7. A machine for straightening rolled sections or other elements comprising a machine bed, spaced primary and secondary housings mounted on the bed, and projecting upwardly therefrom, said primary and secondary housings having two sets of alined openings containing bearings, one set for a group of upper roll shafts and the other set for a group of lower roll shafts, roll shafts in said bearings, rolls on said roll shafts, vertical guides in said housing, slides in said guides, the bearings for the lower roll shafts being mounted in said slides, screws for raising and lowering said slides, captive nuts in said housings engaged by said screws, and power operated means for rotating said nuts, said power operated means including a two part shaft supported in bearings in said housings and having gear means engaging said captive nuts, the two parts of the shaft being releasably coupled together so as to permit of the sliding movement of the secondary housing.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
654,080	Townsend	July 17, 1900
1,943,153	Wirth	Jan. 9, 1934
2,145,526	Penkala	Jan. 31, 1939
2,176,115	Yoder	Oct. 17, 1939