United States Patent

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[33] **Austria**
[31] **A 3910/69**

[54] ROLLING STAND IN PARTICULAR FOR THE SHAPING OF A CAST BAR IMMEDIATELY UPON LEAVING A CONTINUOUS-CASTING PLANT

7 Claims, 4 Drawing Figs.

[52] U.S. Cl. 72/249
[51] Int. Cl. B21b 35/00
[50] Field of Search 72/238, 239, 249

[56] **References Cited**
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ABSTRACT: A rolling stand, particularly destined for shaping a cast bar immediately upon leaving a continuous-casting plant, is described, comprising two upright roll standards having their bottom ends connected by a rigid cross connection and their top ends connected by a detachable cap connection to form a cage, a pair of insert-mounted horizontal rolls arranged to be vertically displaceable along said standards, and a baseplate on which said rolling stand is detachably mounted. According to the invention, a transmission gear enclosed in a casing is detachably suspended on each roll shaft, said gears cooperating with and displaceable along a common vertical driving shaft connected for rotation with a drive arranged below floor; on separation from the baseplate, said rolling stand together with the suspended transmission gears and the driving shaft is vertically liftable and lowerable as a coherent, replaceable unit to move the driving shaft out of and into engagement with said drive.

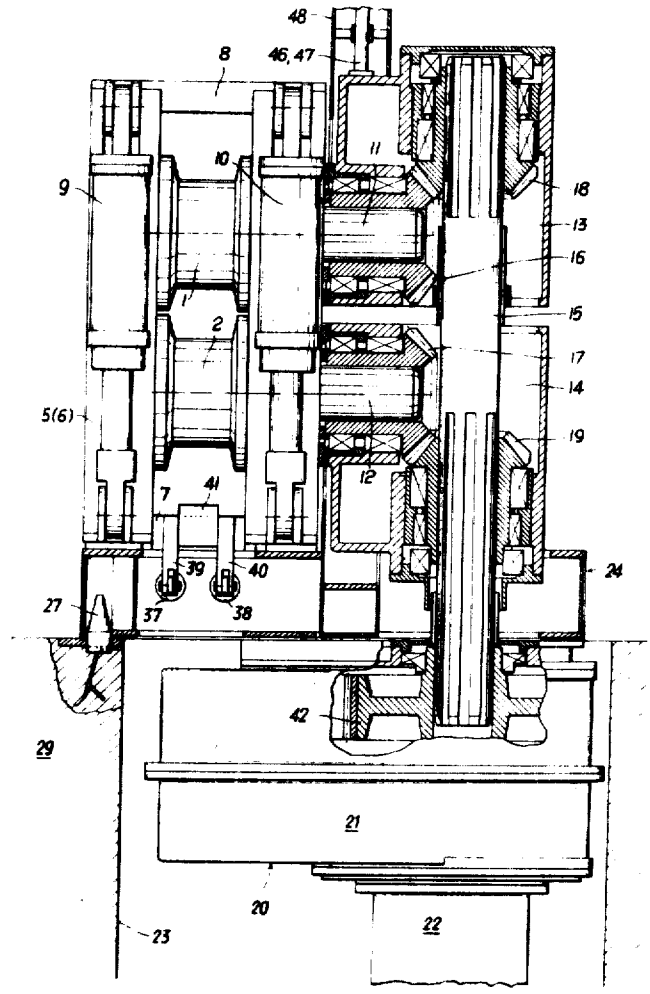

FIG. 1

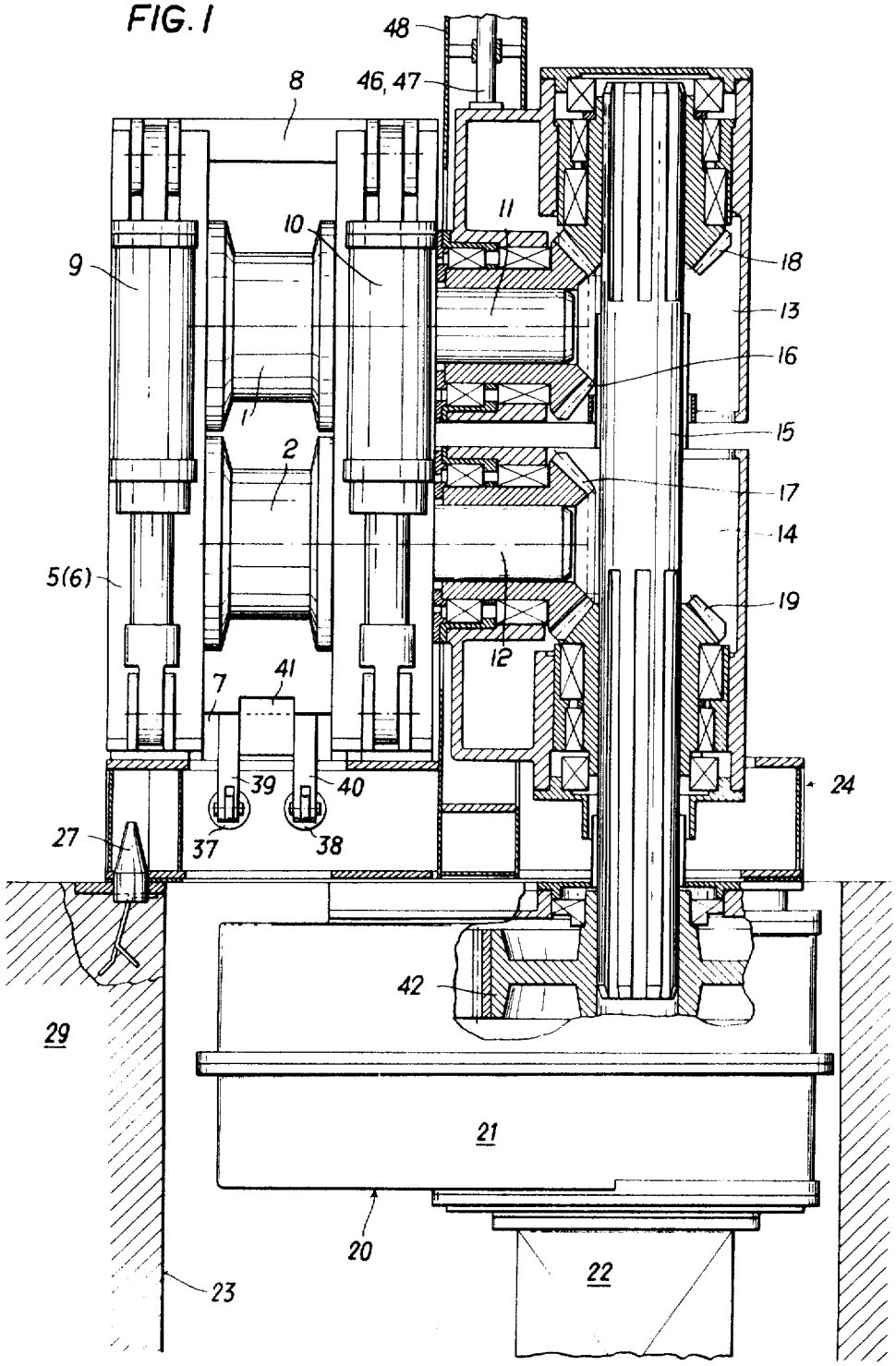

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FIG. 2

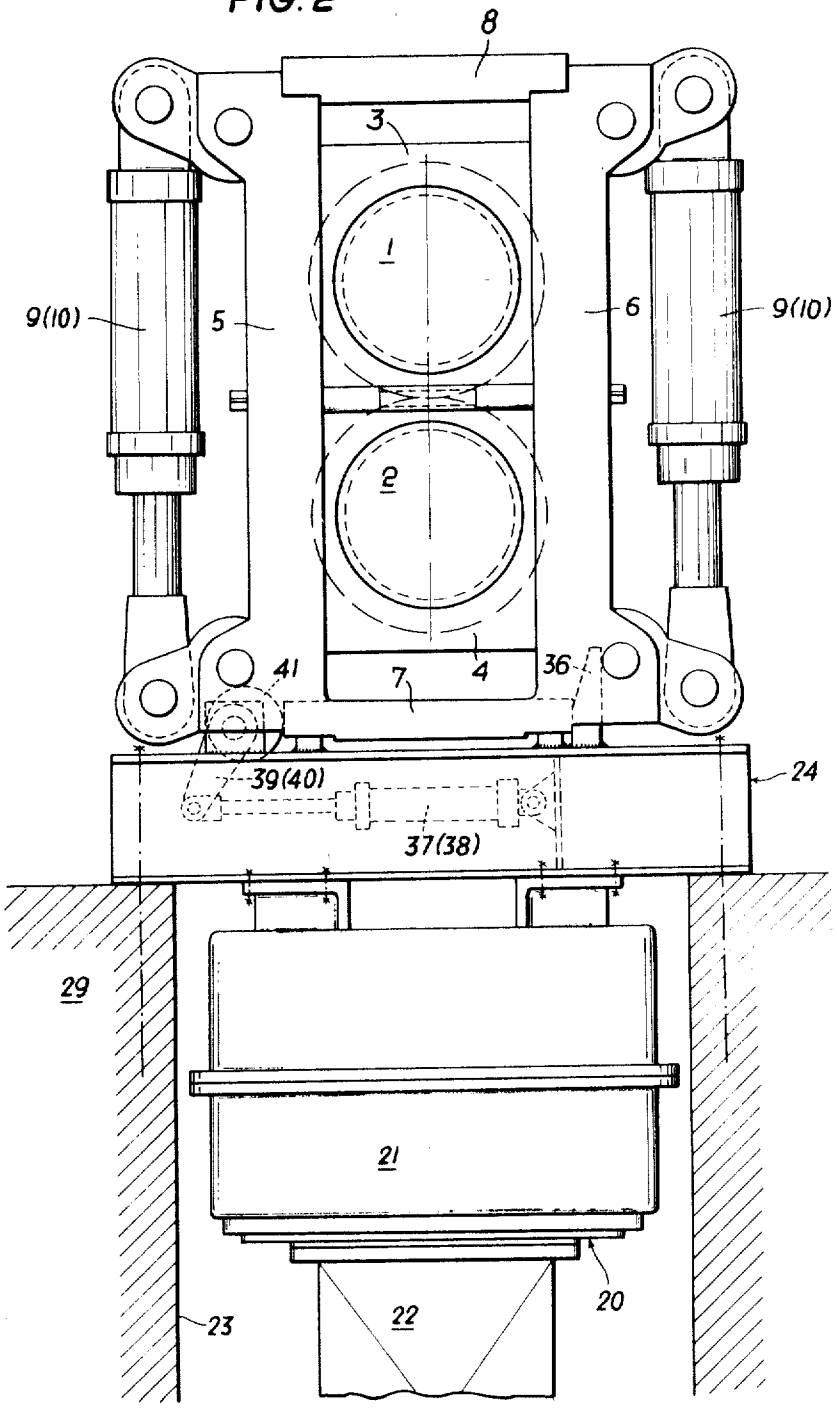

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FIG. 3

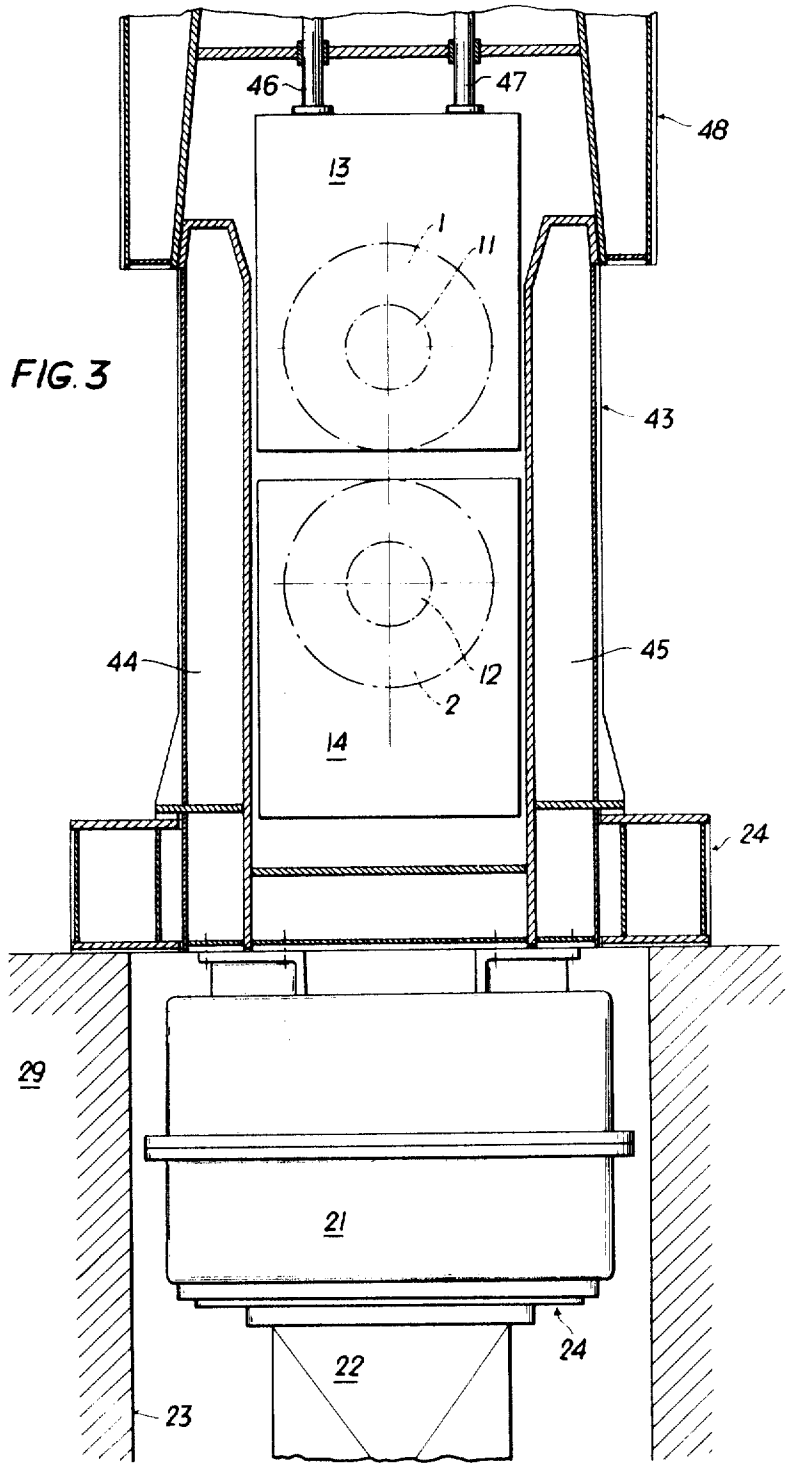

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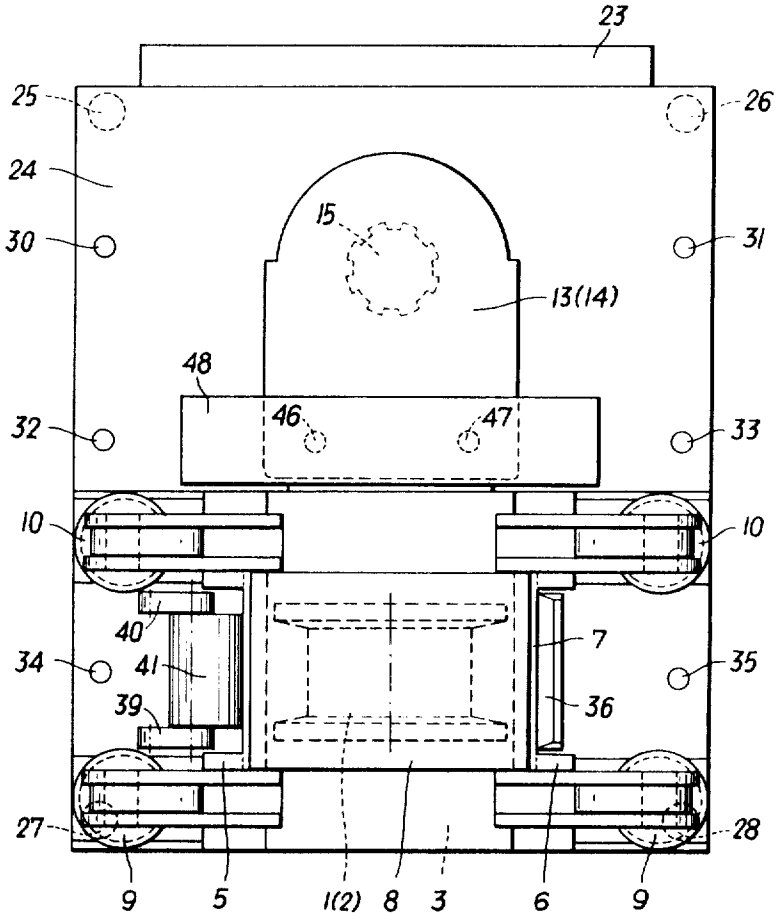
FIG. 4



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ROLLING STAND IN PARTICULAR FOR THE SHAPING OF A CAST BAR IMMEDIATELY UPON LEAVING A CONTINUOUS-CASTING PLANT

The present invention relates to a rolling stand in particular for the shaping of a cast bar immediately upon leaving a continuous-casting plant, with two roll standards in which a horizontal pair of rolls with its inserts is arranged to be vertically displaceable, the roll standards having a rigid cross connection below and a detachable cap connecting above, and the rolling stand being detachably connected with a baseplate, The problem with continuous-casting plants, in particular with multibar continuous-casting plants is to arrange the rolling stands used for further shaping of the castings subsequent to the casting process so as to save most space. The aim is to achieve the closest possible side-by-side arrangement of the rolling stands so that the tundish located above the continuous casting moulds may be small and any loss in temperature of the liquid steel kept at a minimum. The individual rolling stands have also to be placed in the closest possible tandem arrangement. Due to the low casting speed in continuous casting the feed speed of the casting in the rolling stands is much smaller than with conventional rolling trains, resulting in an undesirably high loss temperature in the casting to be shaped in case of considerable distances between the individual rolling stands. The compact structure of the rolling stands makes roll changing rather difficult and time consuming. As rolling stands following continuous-casting plants cannot work independently from the casting and melting operations, any roll changing or exchange of rolling stands, respectively, must be carried out as quickly as possible in case of a change of the rolling program or repairs so that the metallurgical operations will remain unaffected.

According to the invention this problem is solved by suspending on each roll shaft a transmission gear enclosed in a casing and detachable therefrom, said gears cooperating with a common vertical driving shaft operated from below floor, and said rolling stand together with the suspended transmission gears and the driving shaft as a coherent unit being vertically liftable and lowerable upon having been separated from the baseplate and the driving shaft thus being either detachable from or attachable to the drive arranged below floor.

The vertical driving shaft is preferably designed as a spline shaft and engages with a driving wheel of the below-floor drive, fitted with suitable grooves.

The transmission gears suspended on the roll shafts may be displaceable on the driving shaft.

The roll shafts are preferably designed as spline shafts or as two-edge pieces, the bevel gears detachably arranged thereupon having adequately shaped bores.

For the purpose of securing the rolling stand to the baseplate a centering device is suitably provided between the cross connection of the rolling stand and the baseplate.

The fixing of the rolling stand to the baseplate is preferably effected by a hydraulically operated clamping device joining the cross connection of the rolling stand to the baseplate, said clamping device being fixed to the baseplate and engaging the cross connection from below and forming a firm although easily releasable connection together with the centering device.

By means of a frame that is fixed to the baseplate and open at the top the gear casings suspended from the roll shafts are suitably guided in a vertical direction and laterally braced against tilting.

In order that the invention may be more fully understood it will now be described by way of example with reference to the accompanying drawings. FIG. 1 shows a front view of a rolling stand with a sectional view of the suspended gears;

FIG. 2 shows a side view of the rolling stand;

FIG. 3 a vertical sectional view of the frame guiding the gear casings; and

FIG. 4 a plan view of the rolling stand.

Rolls 1, 2 are mounted in inserts 3, 4 being vertically guided in guided U-shaped roll standards 5, 6. The lower ends of the roll standards 5, 6 are rigidly connected by a cross connection 7 and their upper ends by a detachable cap connection 8 to form a cagelike unit. Numerals 9, 10 designate hydraulically operated cylinders for the adjustment of the rolls.

Two separate gear casings 12, 14 are suspended on the roll shafts 11, 12, which may be designed either as spline shafts or as two-edge pieces, and are connected to each other by a vertical drive shaft 15 designed as spline shaft. Bevel gears 16, 17, 18, 19 are located in the gear casings 13, 14. The bores of the bevel gears 16, 17 are adapted to the keys or the two-edge piece of the roll shafts 11, 12 for detachable connection. The bores of the bevel gears 18, 19 have grooves adapted to the keys of the vertical drive shaft 15. Gear casings 13, 14 together with the rolls 1, 2 and the inserts 3, 4 are vertically displaceable towards and from each other for changing the roll gap.

The drive 20, consisting of the gear 21 and the motor 22 is located below floor; said drive may be mounted in a base pit 23 or suspended from the baseplate 24. The base plate 24 is aligned in the direction of rolling by means of centering bolts 25, 26, 27, 28 and fixed to the base 29 by anchor screws 30, 32, 31, 33, 34, 35. A centering device 36 is provided on the base plate 24, by which the rolling stand may be accurately fixed with respect to the roll pass axis. A hydraulically operated clamping device 37, 38, 39, 40, 41 serves for securing the cross connection 7 of the rolling stand to the base plate 24. The levers 39, 40 connected with the hydraulically operated pistons of cylinders 37, 38 are in engagement with an eccentric part 41 revolvably arranged on the base plate 24, acting from below on the cross connection 7 forming — together with the opposite centering device 36 —a firm yet quickly releasable connection.

The torques required for shaping the casting are transmitted by the drive 20 via the spur wheel 42 through the drive shaft 15 and via the bevel gears 18, 19 and 16, 17 to the rolls 1, 2.

The tilting moments developing in the gear casings 13, 14 are accommodated by a U-shaped frame 43 open at the top and solidly connected with the baseplate 24 (FIG. 3). The vertical branches 44, 45 guide the displaceable gear casings 13, 14. On the upper gear casing 13 centering bolts 46, 47 are provided to fix a frame 48 designed like an inverse U resting on the frame 43 on inclined bearing areas and destined to stiffen the upper part of frame 43.

The removal of the rolling stand, of the gear casings 13, 14, of the vertical driving shaft 15 as well as of frame 48 is effected upon opening the clamping device 37, 38, 39, 40, 41 by vertical lifting, e.g. by means of a crane. The driving shaft 15 is accordingly disengaged from the spur wheel 42. The hydraulically operated cylinders 9, 10 and the lubricating spots of the driving gear are coupled to their pertinent connecting lines by means of rapid-action connections, not shown. SAid connections have to be released before removal.

Other assembly activities on the rolling stands, such as roll changing, adjusting the roll gap, the axial adjustment of the rolls and the like, as well as repair and maintenance tasks are done outside the steel mill at roll workshops, a fully assembled and adjusted rolling stand being meanwhile installed in the rolling train. The provision of an exchange rolling stand allows short term unproblematic roll changing with minimum stoppages.

What I claim is:

1. A rolling stand for shaping rolling stock including continuously cast bars, comprising two upright roll standards having their bottom ends connected by a rigid cross connection and their top ends connected by a detachable cap connection, a pair of horizontal rolls mounted in inserts with laterally projecting roll shafts and enclosing an adjustable roll gap being arranged to be vertically displaceable along said standards, a base plate supporting said roll stand, and releasable connection means securing said roll stand on said baseplate, each of said roll shafts being connected to a separate transmission

gear enclosed in a casing detachably suspended on each of said shafts said gears cooperating with a common vertical driving shaft driven by a drive arranged below floor, and said rolling stand together with the suspended transmission gears and said driving shaft being vertically liftable and lowerable as a coherent unit upon release of said connecting means to move said driving shaft out of and into engagement with said drive.

2. The rolling stand set forth in claim 1 wherein said driving shaft is designed as a spline shaft engaging with a driving wheel of said drive which is fitted with correspondingly shaped grooves.

3. The rolling stand set forth in claim 1 wherein said transmission gears are displaceable along said driving shaft.

4. The rolling stand set forth in claim 1 wherein said roll shafts are selected from spline shafts and two-edge pieces and are in releasable engagement with bevel gears of said transmission gears having adequately shaped bores.

5. The rolling stand set forth in claim 1 wherein a centering device is provided between said cross connection of said rolling stand and said baseplate.

6. The rolling stand set forth in claim 1 wherein said connecting means comprise a hydraulically operated clamping device mounted on said baseplate and engaging said rigid cross connection from below to form a firm yet easily releasable connection together with centering means fixing said crossbeam in the direction of rolling.

7. The rolling stand set forth in claim 1 wherein said gear casings suspended n said roll shafts are guided in vertical direction and laterally braced against tilting by means of a frame fixed to said baseplate and open at the top.