

FIG. 1

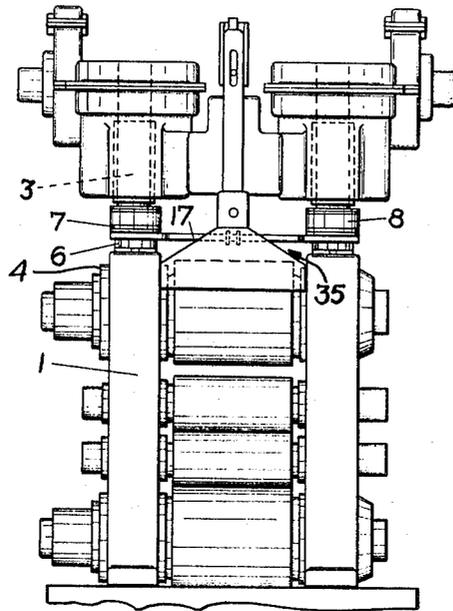
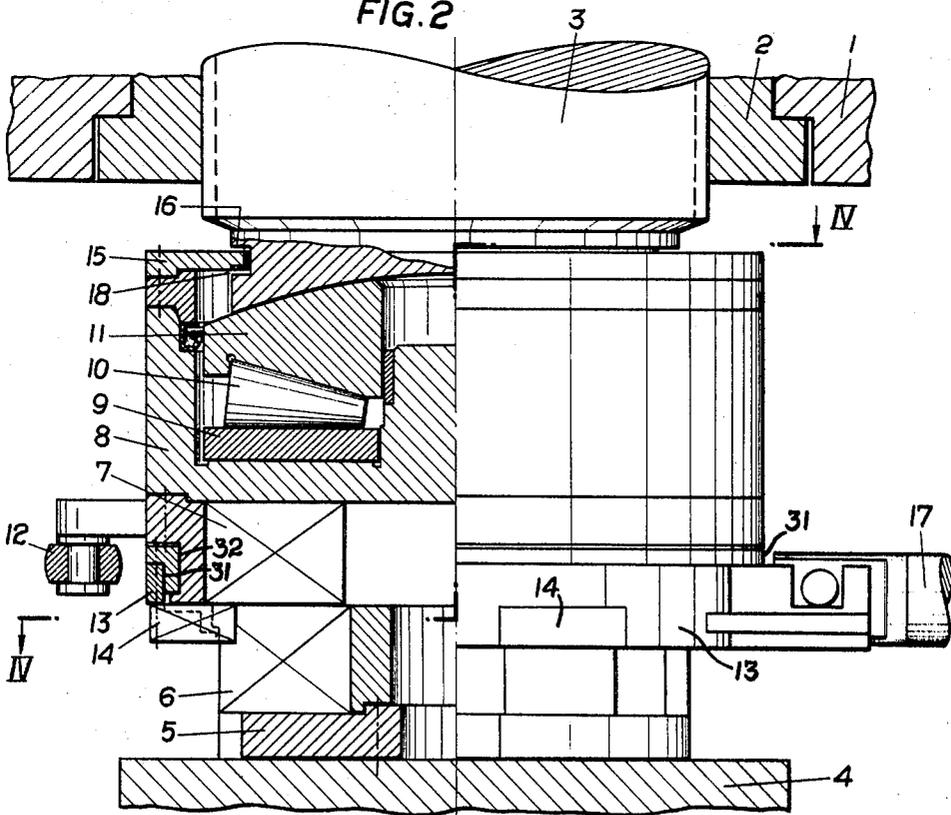


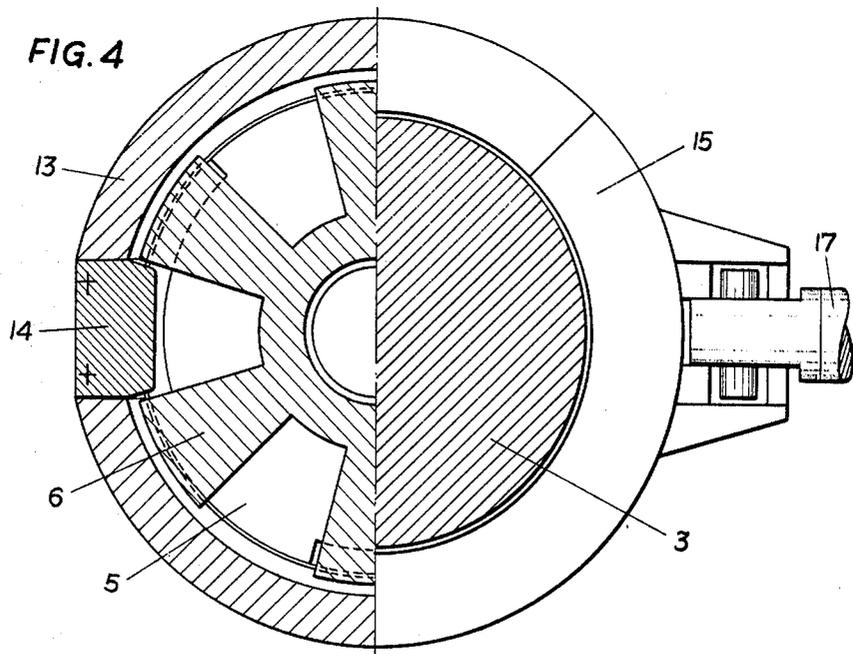
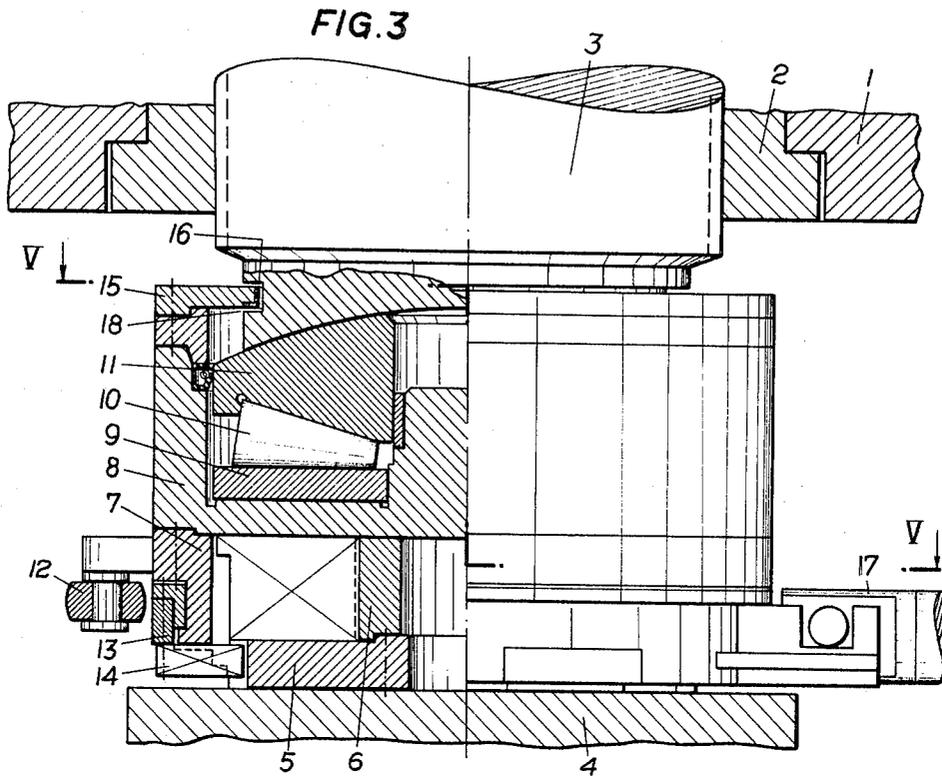
FIG. 2



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FIG. 5

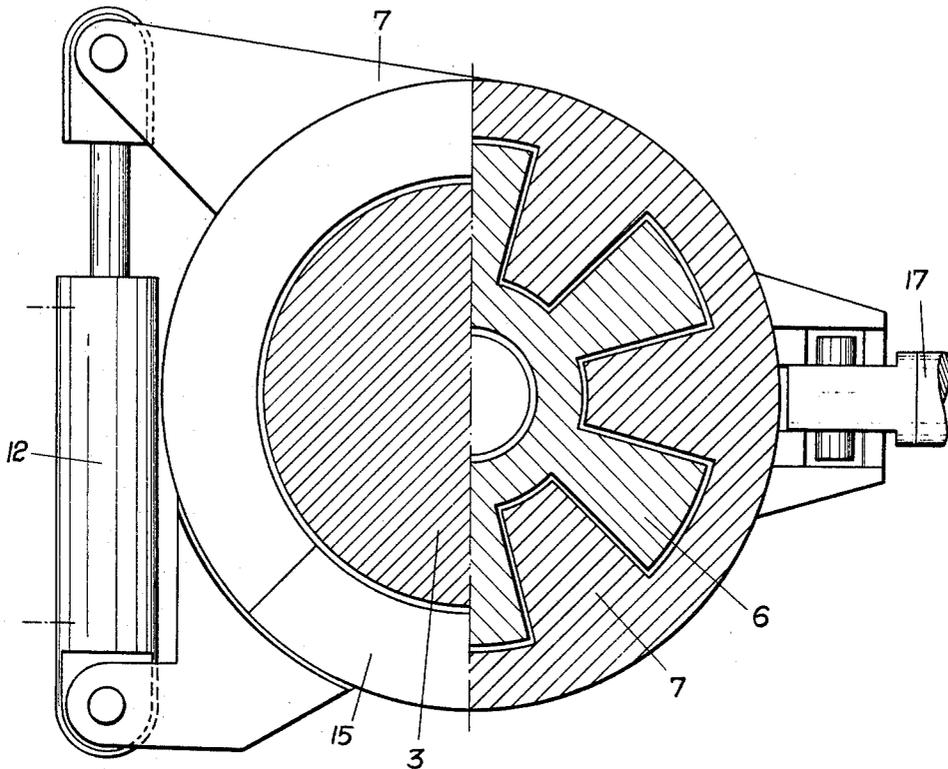
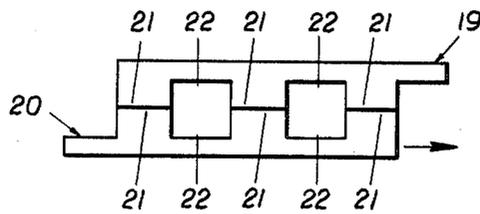


FIG. 6



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DEVICE TO BE USED IN ROLL STANDS

The present invention relates to a device to be used in roll stands containing movable intermediate pieces arranged between the inserts and the adjusting spindles.

It is known to provide roll stands with intermediate pieces arranged between the inserts, i.e. the bearing bodies of the rolls, and the adjusting spindles, which exert the pressure on the inserts. Said intermediate piece may either serve as a mere filling element or else may be provided with a lens-shaped member enabling angular displacement of the inserts; similarly it may be designed as a roll thrust bearing for the reduction of friction, and it may contain a pressure gauge for the measurement of roll pressure.

For mounting and dismantling the rolls sufficient handling space must be provided beneath the adjusting spindles, which has so far been achieved by applying one of the following modes of operation: The one possibility consists in that the adjusting spindles are screwed back sufficiently. Because of the low thread gradient of the adjusting spindles and the low turning rate feasible this is a highly time-consuming operation. On a skin-pass mill stand, for instance, the screwing operation takes 17 minutes to cover a distance of 100 mm. Additional 17 minutes are required for the adjusting operation, which, since the rolls are replaced every 6 hours, involves an extremely long setup time. Aiming at an easier mounting and dismantling of the rolls it has been suggested to design the intermediate piece as a movable, more particularly a removable, part. To this end various constructions have been proposed. They all have in common, however, that a guiding frame receiving the intermediate pieces is provided and this guiding frame, as such, constitutes another obstacle to manipulations at the roll stand and occupies much space.

The present invention aims at avoiding these disadvantages and difficulties by providing an intermediate piece adjustable in the overall height thereof and thus securing free handling space for the dismantling of the rolls, there being no need for dismantling the intermediate piece, as such, as well as for the arrangement of a guiding frame. The construction of the invention resides in that the intermediate pieces are composed of two or more superposed parts provided with projections and recesses, said parts being displaceable in relation to one another from an unengaged position into engagement, in which the overall height of the intermediate member assembled from said individual parts is less than the height thereof when the individual parts are out of engagement.

According to a preferred embodiment the intermediate piece is composed of two cogged discs or cogged plates rotatable relative to each other, in the position of nonengagement the teeth of the cogged discs being superposed, whereas in the engaged position the teeth of the two cogged discs mesh.

According to the invention rotation of the two cogged discs relative to each other suitably is effected by means of a hydraulic cylinder, the one end thereof being hinged to the upper cogged disc, the other end thereof to a switch ring rotatably mounted in the upper cogged disc and coaxial thereto, which switch ring is provided with claws engaging with the gaps of the lower cogged disc.

Another construction enabling alteration in its overall height of an intermediate piece consists in that said intermediate piece is composed of two parts provided with keylike projections and groovelike recesses, said parts being longitudinally displaceable relative to each other.

In order that the invention may be more fully understood embodiments thereof will now be described by way of example with reference to the accompanying drawings, in which:

FIG. 1 shows a roll stand provided with an intermediate piece according to the invention, the other Figures being highly enlarged views of the intermediate piece, viz.

FIG. 2 is a vertical sectional view of an intermediate piece according to a first embodiment of the invention, in nonengagement;

FIG. 3 is a vertical sectional view of the same intermediate piece, in engagement;

FIG. 4 is a horizontal sectional view along the line IV-IV in FIG. 2;

FIG. 5 is a horizontal sectional view along the line V-V in FIG. 3;

FIG. 6 is a diagrammatical view of another embodiment of the intermediate piece according to the invention.

In the roll housing 1 of the roll stand a bushing 2 with female thread is provided, in which the adjusting spindle 3 is screwably arranged. In the upper insert 4 the upper backup roll is mounted. Between the adjusting spindle 3 and the insert 4 an intermediate piece is arranged, consisting of a lower cogged disc 6 and an upper cogged disc 7, rotatable in relation to each other. On the upper insert 4, which is pressed upwards by the roll pressure, a base disc 5 is arranged transmitting the pressure via the lower cogged disc 6 and the upper cogged disc 7, the breaker block 8, the pressure disc 9, the rolls 10 and the lens-shaped member 11 provided with a spherical cap to the adjusting spindle 3. In the rolling position shown in FIG. 2 the lower cogged disc 6 and the upper cogged disc 7 are out of engagement, i.e. the teeth of the discs are superposed. For relative rotation of the cogged discs a hydraulic cylinder 12 is provided (FIG. 5), the one end thereof being hinged to the upper cogged disc 7, the other end thereof to a composite switch ring 13. The switch ring 13 is fastened to carrier ring 31 which is rotatably mounted in the annular groove 32 formed in the periphery of the upper cogged disc 7, the ring 13 and disc 7 being coaxial.

Along its lower edge, as seen in FIGS. 2, 3 and 4, the switch ring 73 carries a plurality of angularly spaced claws 14 which engage corresponding ones of the gaps of the lower cogged disc 6. When the hydraulic cylinder 12 is actuated, the ring 13 and upper disc 7 rotate relative to each other, while the claws 14, which are in engagement with the lower disc 6, prevent relative rotation between the ring 13 and disc 6. In order that the intermediate pieces retain their positions even upon removal of the inserts 4, the upper cogged disc 7 together with the breaker block 8 is suspended on a fixing ring 15 received in a ring groove 16 of the adjusting spindle. Seventeen is a connecting rod, connecting the switch ring 13 to another switch ring of identical construction arranged on an opposite spindle of the roll stand. In this manner an undesired rotation of the upper and lower cogged discs during rolling is avoided.

If in the course of operation it is necessary to replace the work rolls, appropriate space must be provided above the inserts 4, in order to enable lifting of said inserts. To this end the hydraulic cylinder 12 causes the upper cogged disc 7 and consequently the breaker block 8 as well as the pressure disc 9 to turn into a position where the two cogged discs 6 and 7 are superposed in tooth-to-gap alignment. The insert 4, the base disc 5 and the lower cogged disc 6 may now be hydraulically lifted, by the roll balance means 35 conventionally employed in roll stands of the type herein disclosed, whereby engagement is effected, in which position the height of the intermediate member is less than in nonengaged position. The engaged position is illustrated in FIG. 3.

Suitably the surfaces of the two cogged discs are brought out of contact prior to turning the cogged disc 7. This is effected by either lowering the insert or screwing up the adjusting spindle. This lifting stroke should be somewhat greater than the clearance 18 between fixing ring 15 and ring-groove 16.

If it is desired to remove the backup roll and thus the insert 4 after dismantling of the work rolls, the switch ring 13 may be turned back in the position shown in FIG. 3, whereupon the claws 14 move into a position beneath the teeth of the cogged disc 6 and prevent this disc 6 from being lowered together with the insert 4.

Another embodiment of the intermediate piece according to the invention is diagrammatically illustrated in FIG. 6, wherein the intermediate piece consists of two parts, 19, 20 longitudinally displaceable in relation to each other which parts are provided with keylike projections 21 and groovelike recesses 22. Upon displacement the keylike projections 21 of the one part engage with the groovelike recesses 22 of the

other part. Here too, the overall height of the intermediate piece in engaged position is less than the height thereof in unengaged position.

What I claim is:

1. In a roll stand comprising roll-supporting inserts and adjusting spindles, means intermediate said inserts and spindles comprising at least two superposed parts each having projections and recesses, and means for displacing said parts relative to one another between a position of nonengagement and a position of engagement, the overall height of the assembled intermediate means in said position of engagement being less than the overall height of said at least two parts in said position of nonengagement.

2. The device set forth in claim 1, wherein said intermediate means is composed of two discs having interengageable teeth and gaps, said discs being rotatable in relation to each other from a position of nonengagement, in which said teeth of said discs are superposed, into a position of engagement, in which the teeth of the one disc engage with the gaps of the other disc

3. The device set forth in claim 1, wherein said intermediate means is suspended in a fixing ring received in a ring groove of said adjusting spindle.

4. In a roll stand comprising roll-supporting inserts and adjusting spindles, intermediate means between said inserts and said spindles, each composed of an upper disc and a lower disc provided with interengageable teeth and gaps and hydraulic cylinder means for rotating said discs relative to each other between a position of tooth-to-tooth alignment and a position of tooth-to-gap alignment, whence a vertical displacement effects engagement of said upper and lower discs, said cylinder means being connected with one end to said upper disc and hinged with its other end to a switch ring rotatably mounted in said upper disc and coaxial thereto, said switch ring being provided with claws engaging with the gaps of said lower disc.

5. The device set forth in claim 4, wherein the switch rings of two opposite adjusting spindles of the roll stand are connected by connection means.

6. The device set forth in claim 1, wherein said intermediate means is composed of two elongated parts provided with alternating key-shaped projections and groove-shaped recesses, said parts being longitudinally displaceable in relation to each other to move said projections and recesses in and out of engagement.

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