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(54) **Improvements in rolling mills.**

(57) In a rolling mill line for rolling rod or bar, each mill stand is located on a wheeled carriage which also has feet projecting outwardly from a pair of opposite sides thereof. In use, the carriage is supported with the feet on a rigid foundation so that the passline of the mill rolls is at a fixed predetermined height above ground level. For roll changing, a lifting rail mechanism lifts the stand off the foundation and the wheels enable the stand to be withdrawn from the line along tracks at ground level.

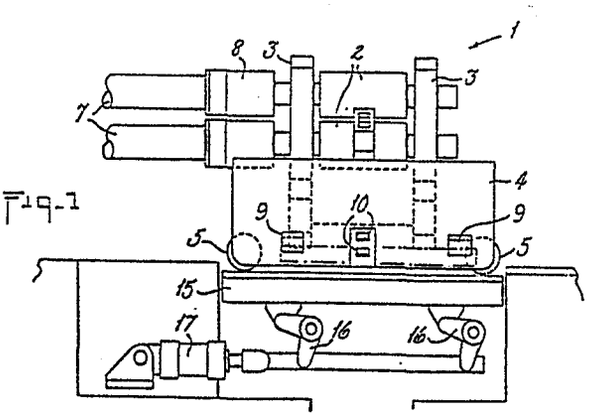

Fig.1

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IMPROVEMENTS IN ROLLING MILLS

This invention relates to rolling mill stands, particularly mill stands for rolling rod and bar sections.

It is well known with this type of mill stand to remove the entire stand from the mill line for maintenance and roll changing. It is also known that the guides for guiding the workpiece between the rolls are adjustably positioned on the mill stand while it is out of the mill line so that mill stands and the guides are changed together.

It is usual for a mill line to include some stands with vertical rolls, some stands with horizontal rolls and some stands have both horizontal and vertical rolls but it is most important that the passline for all the stands arranged in tandem in the mill line are fixed at a predetermined height relative to ground level.

It is also desirable that the stands should be displaceable on their own wheels into and out of the mill line since this simplifies and speeds up the mill stand change procedure. It is usual for the wheels to run along a track and it most desirable that the track is at ground level.

It is an object of the present invention to

provide an arrangement whereby rolling mill stands having different roll configurations can be rapidly moved into and out of position in the mill line while retaining a common passline.

Accordingly, the present invention resides in the combination of a rolling mill stand comprising a housing structure rotatably supporting a pair of mill rolls and a wheeled carriage having outwardly projecting feet located on opposite sides thereof at such positions that, with the carriage supported by the feet on a rigid foundation, the passline between the rolls is at a predetermined height relative to ground level and means for raising and lowering the carriage between the position where the carriage is supported on the feet and a position where the carriage is displaceable on its wheels along a track at ground level.

By providing the outwardly projecting feet, the mill stand can be supported on a rigid foundation when the mill is rolling metal and this is far superior to having the stand supported on the carriage wheels when it is rolling metal.

Conveniently, the feet are removably mounted on the carriage and are positionable at different predetermined vertical positions on the carriage with respect to the passline.

The carriage may be provided with additional outwardly projecting feet on each of the opposite sides, the additional feet being at right angles to the first-mentioned feet and arranged such that the carriage can be positioned with said additional feet on the foundation and the passline between the rolls at said predetermined height relative to ground level.

In order that the invention may be more readily understood, it will now be described, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 is a side elevation of a rolling mill stand in accordance with one embodiment of the invention;

Figure 2 is a side elevation of an alternative form of mill stand;

Figure 3 is a scrap view of part of the mill stands shown in Figures 1 and 2;

Figure 4 is a side elevation of an alternative form of mill stand; and

Figure 5 is a sectional side elevation of a general arrangement of the run-out tracks for the mill stands of a bar mill.

Referring to Figure 1, a rolling mill stand 1 forming part of a bar mill has a pair of horizontal rolls 2 rotatably supported in housings 3. The

housings are permanently supported on a carriage 4 which includes two pairs of wheels 5 which enable the carriage, including the housings and the rolls, to be displaced in the direction of the length of the rolls. In use, the rolls are driven by spindles 7 connected to the roll ends through couplings 8.

On each of the sides of the carriage 4 which is parallel with the roll axes, there is a pair of outwardly extending feet 9 on which the stand can be supported on a rigid foundation (not shown). On each of the sides of the carriage, between the feet 9, there is a rigid plate providing a pair of slots 10 located one above the other.

Figure 2 shows a similar form of mill stand, except that the stand is provided with a universal attachment 11 to enable H-section beams to be rolled. In this embodiment, the feet 9 have been re-fitted to the side wall of the carriage at a rather higher level with respect to the wheels 5 than is the case with the stand shown in Figure 1.

The arrangement of the feet 9 in the two embodiments is such that, whichever mill stand is supported with its feet on the rigid foundation, the passline between the rolls in the stand will be at the same predetermined vertical height above ground level.

As shown in Figure 3, on each side of the

carriage 4 there is a hydraulically operated clamping device 12 mounted on a foundation 13. This foundation defines a pit carrying a pair of vertically displaceable rails 15. The rails are mounted on bell crank levers 16 operable by a piston-cylinder device 17 which, on being actuated, pivots the bell crank levers to raise and lower the rails 15. When the stands are in use, they are supported from their foundation with their feet 9 resting on the foundation. The stand is displaced until the clamping mechanisms 12 are aligned with, and project into, one of the slots 10 on each side of the stand to locate the stand rigidly in position.

In the arrangement shown in Figure 1, the position of the feet 9 is such that, when the rails 15 are lowered to cause the feet 9 to rest on the foundation, the clamping mechanism is in line with the lower of the two slots 10, as shown in Figure 3.

In the arrangement shown in Figure 2, however, the feet 9 are positioned on the carriage such that, when the feet are supported on the foundation, the clamping mechanism is in line with the upper of the two slots 10.

With these arrangements, therefore, stands of different types can be located on the foundation and locked into position by the clamping mechanisms and the

passline will be at a common vertical height. In both arrangements, however, the mill stands can be lifted by the rails 15 to a position where they can be rolled off the rails 15 and withdrawn from the mill line at ground level.

Figure 4 shows a carriage which can support rolls which are either horizontal or vertical. The carriage 20 has a first set of feet 28 projecting from a pair of opposite side walls at such a position that, when the carriage is supported with these feet on the foundation, the passline of the rolls supported by the carriage is at the correct height. A plate 25 provides a socket 23 for receiving the clamping mechanism. On the same sides of the carriage, but at right angles thereto, are a pair of additional feet 22. These feet are so positioned that, when a carriage has been turned through 90°, the passline of the rolls carried by the carriage is at the same predetermined height. A further plate 25 defines a socket 23 for receiving the clamping mechanism. The carriage is provided with two sets of wheels 21, 26 with the wheels arranged such that they can be lifted by the rails 15 to ground level to enable the carriage to be withdrawn from the mill train along tracks positioned at ground level.

Referring to Figure 5, for each stand in the mill there is a track 40 extending away from the mill

at right angles thereto. This track can be horizontal and the mill stands can be raised or lowered on to the lifting rails 12 until the wheels on the stands can be rolled on to the tracks 40 to enable the stands to be displaced along the track. At the outer end of each of the tracks there is a duplex roll change carriage 44 which is displaceable in the direction at right angles to the length of the tracks 40. At roll changing, a winch is used to draw the mill stand along the track 40 and on to the duplex carriage, the carriage then being displaceable along its track until the second position is in line with the track 40 and a replacement mill stand, which has previously been mounted on the carriage, is displaced along the track into the rolling mill. The track may be inclined upwardly from the rolling mill to the duplex carriage so that a replacement stand on the carriage can be returned by gravity down the track into the rolling mill.

It is not convenient to have the floor on the roll change side of the mill permanently at an inclined position since this can be dangerous to personnel working the vicinity of the mill. To this end, the floor plates 46 on the side of the mill which support the track 40 may be inclined temporarily in order to form a smooth incline between the mill and the duplex carriage. When the tracks are inclined, it is

convenient to provide wheels on the carriages at different levels so that, as the carriage moves along the inclined track, the support surfaces of the carriage which support the mill stand remain horizontal.

Claims:

1. The combination of a rolling mill stand comprising a housing structure rotatably supporting a pair of mill rolls and a wheeled carriage having outwardly projecting feet located on opposite sides thereof at such positions that, with the carriage supported by the feet on a rigid foundation, the passline between the rolls is at a predetermined height relative to ground level and means for raising and lowering the carriage between the position where the carriage is supported on the feet and a position where the carriage is displaceable on its wheels along a track at ground level.

2. The combination claimed in claim 1, in which said feet are removably mounted on the carriage and are positionable at different predetermined vertical positions with respect to the passline.

3. The combination claimed in claim 1 or 2, in which additional outwardly projecting feet are provided on each of said opposite sides, said additional feet being at right angles to the first-mentioned feet and arranged such that the carriage can be positioned with said additional feet on the foundation and the passline

between the rolls is at said predetermined height relative to ground level.

4. The combination claimed in claim 3, in which the carriage has additional wheels arranged to support the carriage in a position at right angles to the position in which the carriage is supported by the first-mentioned wheels.

5. The combination claimed in any preceding claim, in which the means for raising and lowering the carriage are a set of rails engageable with said wheels or said additional wheels and a piston-cylinder device for raising and lowering the set of rails.

6. The combination claimed in claim 5, in which the piston-cylinder device is connected to the rails through bell crank levers.

7. The combination claimed in any preceding claim, in which on each of said sides of the carriage there is a socket for receiving a locating latch when the carriage is supported by the feet on the rigid foundation.

8. The combination claimed in claim 2, wherein in each side of the carriage for each predetermined vertical position there is a separate socket for receiving said latch.

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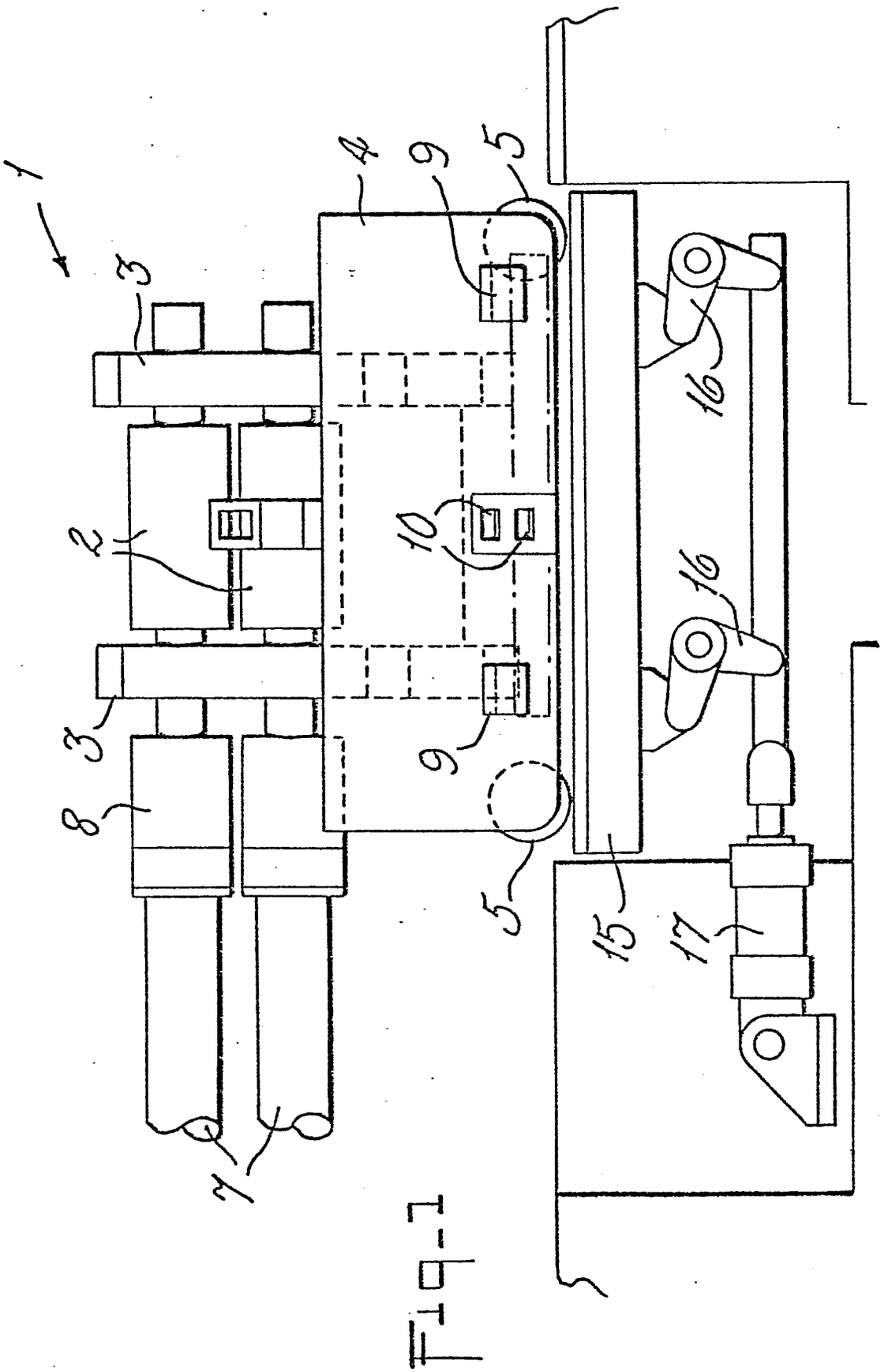

Fig-1

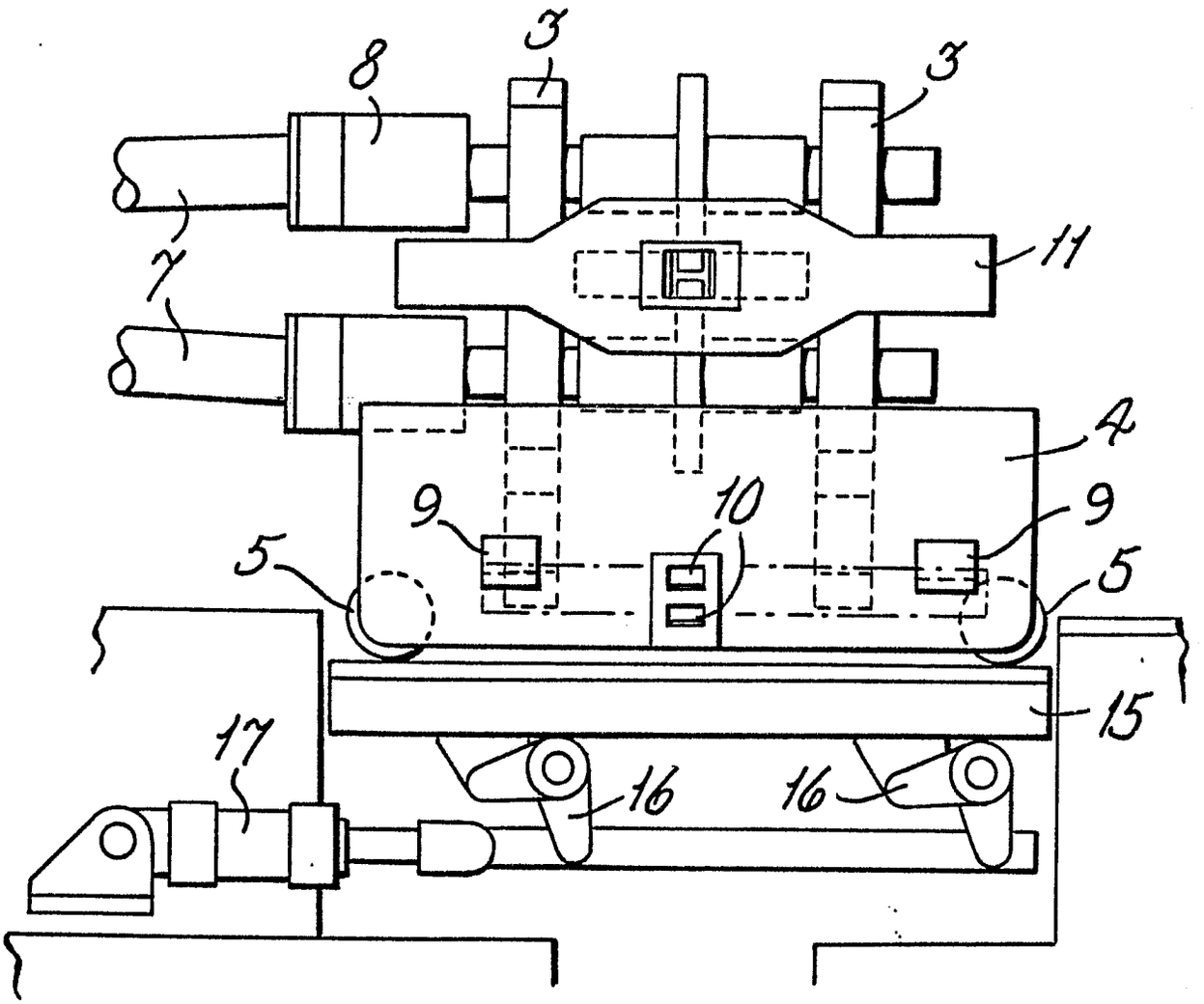

Fig-2

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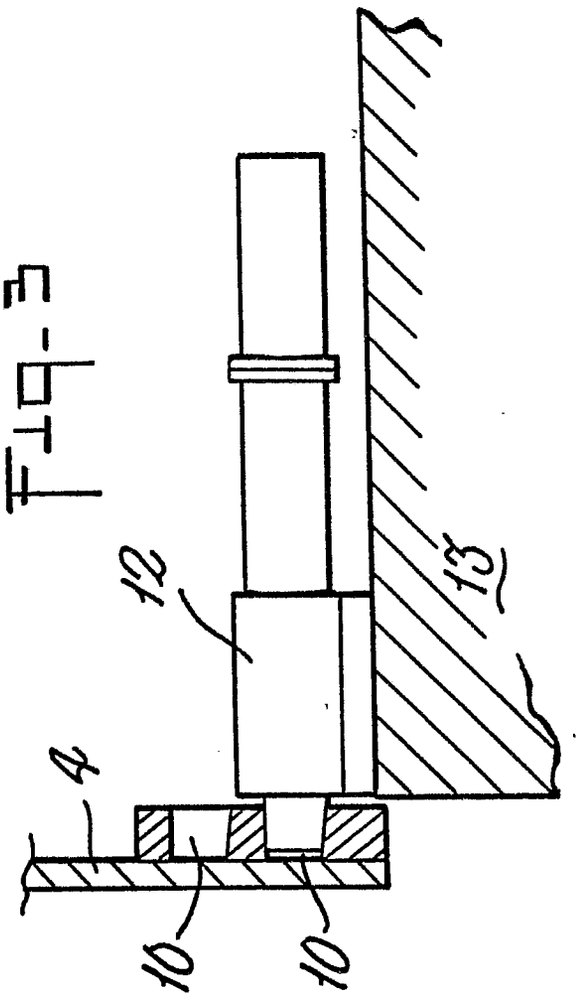

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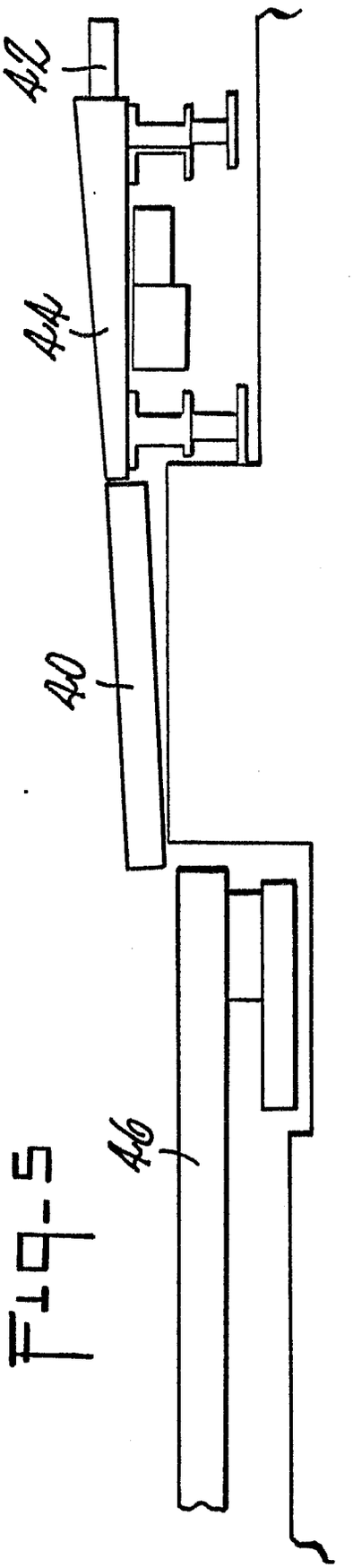

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Fig. 4