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(71) Applicants
BWG Bergwerk- und
Walzwerk-Maschinenbau
GmbH,
Mercatorstrasse 74,
4100 Duisburg 1,
West Germany.
(72) Inventors
Willi Bruno Manthey,
Horst Deiwick.

(74) Agents
Hulse & Co.,
Cavendish Buildings,
West Street,
Sheffield S1 1ZZ.

(54) An appliance for the overturning of blooms or like semi-finished products

(57) An appliance for the overturning of bars or sheets (1) has lifting arms (3) which pivot in a common plane on one side of a turning axis (2) and lowering arms (4) which pivot in a common plane on the other side of the axis, together with transfer rollers (6) disposed between the arms (3 and 4). The work (1) to be overturned is supported by its edge as it passes over the rolls and is transferred in a rolling movement without appreciable relative movement relative to the lifting and lowering arms (3 and 4) or none at all relative to the supporting rolls (6), thus avoiding the formation of scratch, knock and chafe marks.

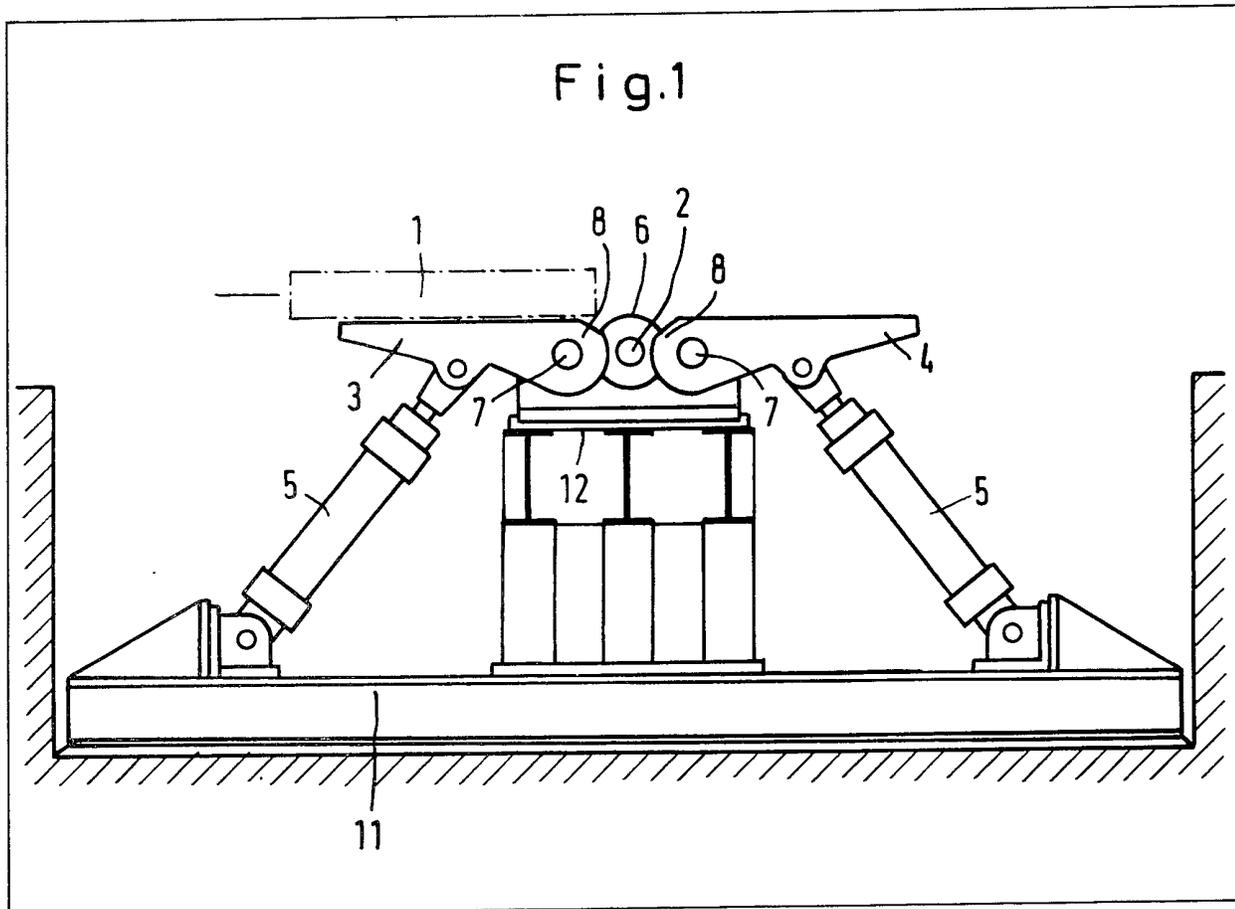


Fig.1

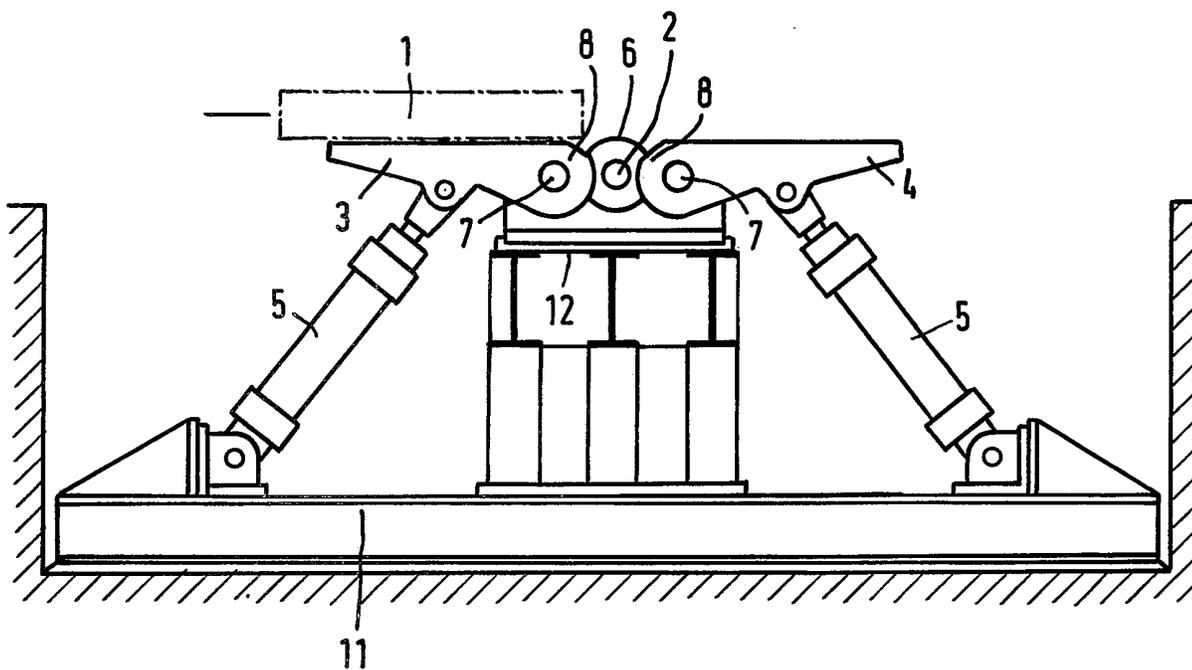


Fig.2

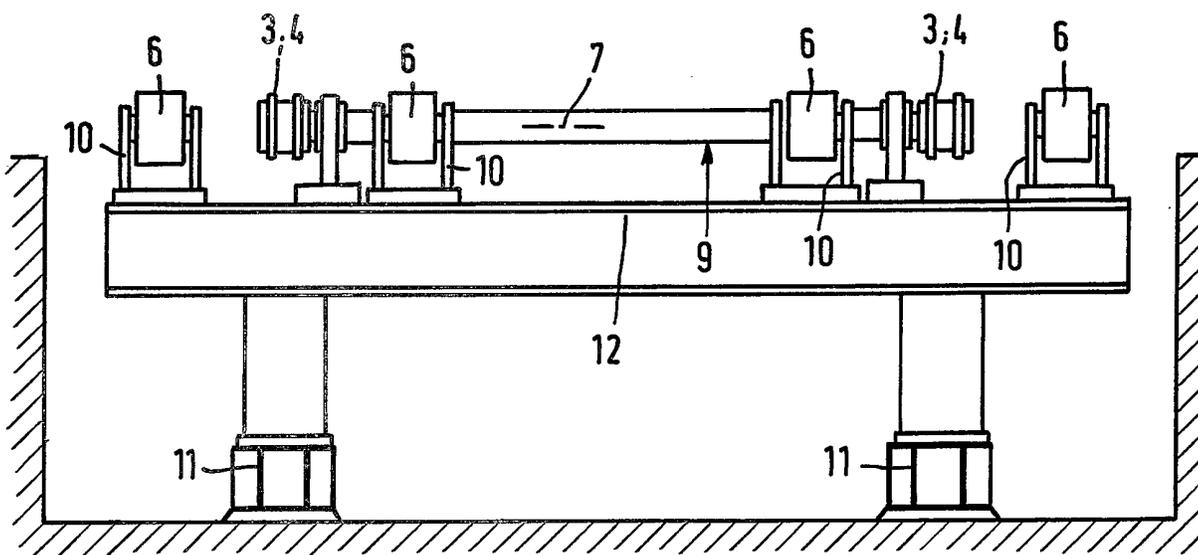
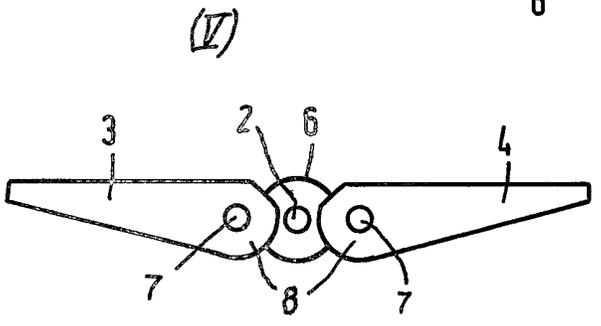
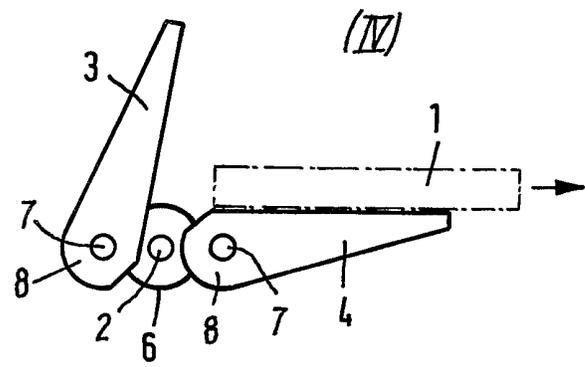
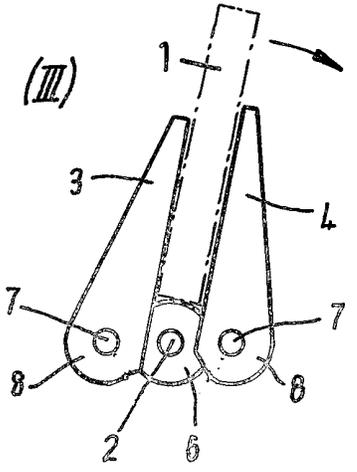
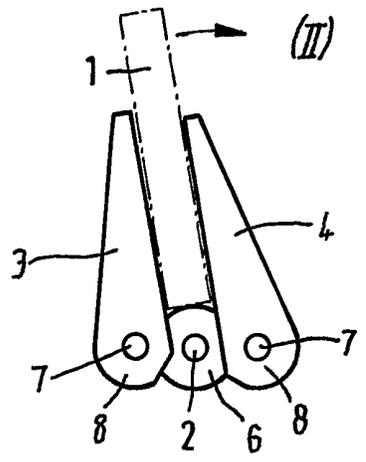
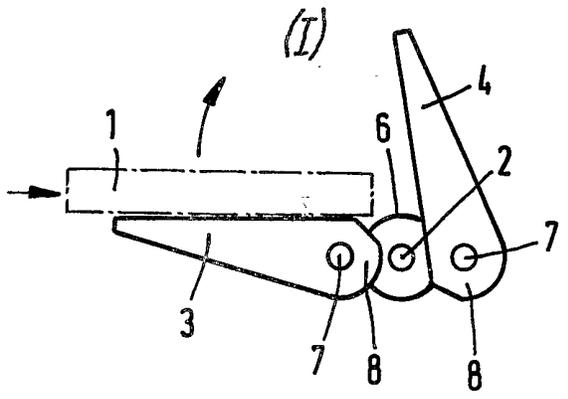


Fig.3



SPECIFICATION

An appliance for the overturning of blooms or like semi-finished products

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This invention relates to an appliance for the overturning of blooms or like semi-finished products, having lifting arms mounted to swivel in a common plane on one side of a turning axis and lowering

10 arms mounted to swivel in a common plane on the other side of the turning axis, together with a transfer device disposed between the power-driven lifting and lowering arms.

The term "semi-finished product" is used in the context of this invention to include sheets, bars, thick slabs or similar flat stock.

Overturning devices are used to turn cold or hot semi-finished products, usually through 180°. Such overturning appliances are used in steelworks, for example, when the semi-finished product must be worked, surface treated or inspected on both faces. One special application for overturning appliances is beyond flame-scarfing machines, when the semi-finished product must be overturned after a first scarfing pass in order to subject the other face and sideface to the flame-scarfing treatment.

There are known overturning appliances of the type just described, in which the lifting and lowering arms have shoulders which turn the appliance into a transfer device. As the semi-finished product is upturned beyond the angle of repose on the lifting arms, it slips down against the shoulders, and after transfer to the lowering arms it is subjected to a second severe jolt during the lowering stage. In another known overturning appliance, the transfer device has tilting links between the lifting and lowering arms. In this case, the semi-finished product is positively guided on to the tilting links as it is transferred from the lifting arms to the lowering arms and consequently as it is turned from the prone position to the vertical position, thereby acquiring scratch and chafe marks on the lower sideface. This type of damage impairs the quality of the stock and may even lead to rejection after subsequent finish rolling operations.

The object of the invention is to provide an appliance for the overturning of blooms or like semi-finished products, of the type initially described, which adopts simple means to overturn the material without damage.

According to the present invention, in an overturning appliance of the type initially described, the transfer device has one or more supporting rolls disposed on the turning axis. The invention arises from the discovery that each bloom can be set up in a relatively exact posture on the lifting arms, such that a minimum clearance still remains between the supporting rolls and the adjacent long sideface of the bloom, under all circumstances. Consequently, as the lifting arms raise the bloom towards the vertical position, the bloom is supported by its long sideface on the supporting rolls. As the bloom is transferred from the lifting to the lowering arms and passes through the apex position, the bloom resting on the supporting rolls, which rotate with it, is eased

over from the lifting to the lowering arms without moving appreciably relative to the arms or none at all relative to the supporting rolls, in a rolling movement which prevents the formation of any scratch, knock or chafe marks. After passing the apex position, the lowering arms take the weight of the bloom and lower it into the horizontal posture. The lifting arms return to the initial receiving position under no load.

70 Further and preferred features of the invention will now be described. The turning axes for the lifting and lowering arms and the turning axis for the supporting rolls are preferably coplanar, and the supporting rolls preferably bridge the gap between the adjacent ends of the lifting and lowering arms. Seen in horizontal projection, this gives an effectively gapless junction between the lifting arms and the lowering arms, in the region of the supporting rolls. This gapless junction facilitates a particularly exact positioning of the long sideface of the bloom relative to the supporting rolls when it is set down on the lifting arms, so that as soon as the lifting arms start to rise the bloom can find support on the supporting rolls. The lifting and lowering arms are preferably mounted on a single longitudinal shaft on either side of the transfer device, whereas the supporting rolls of the transfer device are preferably mounted in individual bearing blocks and can therefore be brought close together or set with larger spaces according to specific requirements. It is also possible in principle to provide the lifting and lowering arms with individual swivel bearings.

The overturning appliance of the invention, as a whole, has a common base frame constituting a tilting table for the accommodation of the lifting and lowering arms and the supporting rolls, and thus constitutes a single constructional unit.

The advantages accruing from the invention are to be seen substantially in that it provides an overturning appliance employing simple means to protect blooms or like semi-finished products during overturning operations, so that no scratch, knock or chafe marks are formed to lead to possible reductions in quality or rejection when the stock is finish rolled.

110 An embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 is a diagrammatic side elevation of an overturning appliance in accordance with the invention in the starting position;

115 *Figure 2* is a part-sectional end elevation of the appliance of *Figure 1*; and

Figure 3 shows the lifting and lowering arms in the object of *Figure 1*, in various working positions (I to V).

The drawings show an appliance for the overturning of blooms 1 or like semi-finished products, having in basic construction lifting arms 3 mounted to swivel in a common plane on one side of a turning axis 2 and lowering arms 4 mounted to swivel in a common plane on the other side of the turning axis 2. The lifting and lowering arms 3 and 4 are driven by means of pneumatically or hydraulically powered cylinder and piston units 5 (but a mechanical drive is conceivable). A transfer device disposed between

the lifting and lowering arms 3 and 4 has a number of supporting rolls 6 disposed on the turning axis 2, to support the bloom 1 in question. The turning axes 7 for the lifting and lowering arms 3 and 4 and the turning axis 2 for the supporting rolls 6 are coplanar, and the supporting rolls 6 bridge the gap between the adjacent ends of the lifting and lowering arms 3 and 4. The bosses 8 of the lifting and lowering arms 3 and 4 are spaced from each other by less than the diameter of the supporting rolls 6. Whereas the lifting and lowering arms 3 and 4 respectively are mounted on a single longitudinal shaft 9 on either side of the transfer device, the supporting rolls 6 of the transfer device are mounted in individual bearing blocks 10, so that any required spacing can be set between the supporting rolls 6. A common base frame 11 is provided for the overturning appliance incorporating a table 12 for accommodation of the lifting and lowering arms 3 and 4 and the supporting rolls 6. The cylinder and piston units 5 for the lifting and lowering arms 3 and 4 are pivotally linked to the lifting and lowering arms 3 and 4 at one end and the base frame at the other end.

The operating sequence in the overturning appliance of the invention is illustrated diagrammatically in Figure 3. As the lifting arms 3 raise the bloom 1 from the receiving position (I) towards the vertical, the bloom is supported by its long sideface on the supporting rolls 6, as shown in position (II). As the bloom is transferred from the lifting arms 3 to the lowering arms 4 and passes through the apex position, between positions (II) and (III), the bloom resting on the supporting rolls, which rotate with it, is eased over from the lifting arms to the lowering arms without moving appreciably relative to the arms or at all relative to the supporting rolls, in a rolling movement which prevents the formation of any scratch, knock or chafe marks. After passing the apex position, the lowering arms 4 take the weight of the bloom 1 and lower it into the horizontal posture, which is the forwarding position (IV), and the lifting arms 3 return to an at rest position (V) under no load.

CLAIMS

1. An appliance for the overturning of blooms or like semi-finished products, having lifting arms mounted to swivel in a common plane on one side of a turning axis, and lowering arms mounted to swivel in a common plane on the other side of the turning axis, together with a transfer device disposed between the power-driven lifting and lowering arms, the transfer device having one or more supporting rolls disposed on the turning axis.
2. An appliance as in Claim 1, wherein the turning axes for the lifting and lowering arms and the turning axis for the supporting rolls are coplanar, and the supporting rolls bridge the gap between the adjacent ends of the lifting and lowering arms.
3. An appliance as in Claim 1 or Claim 2, wherein the lifting and lowering arms are mounted on a single longitudinal shaft on either side of the transfer device, and the supporting rolls of the transfer device are mounted in individual bearing blocks.
4. An appliance as in any one of Claims 1 to 3,

wherein a common base frame is provided, having a tilting table for the accommodation of the lifting and lowering arms and the supporting rolls.

5. An appliance for the overturning of blooms or like semi-finished products, substantially as hereinbefore described with reference to the accompanying drawings.

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