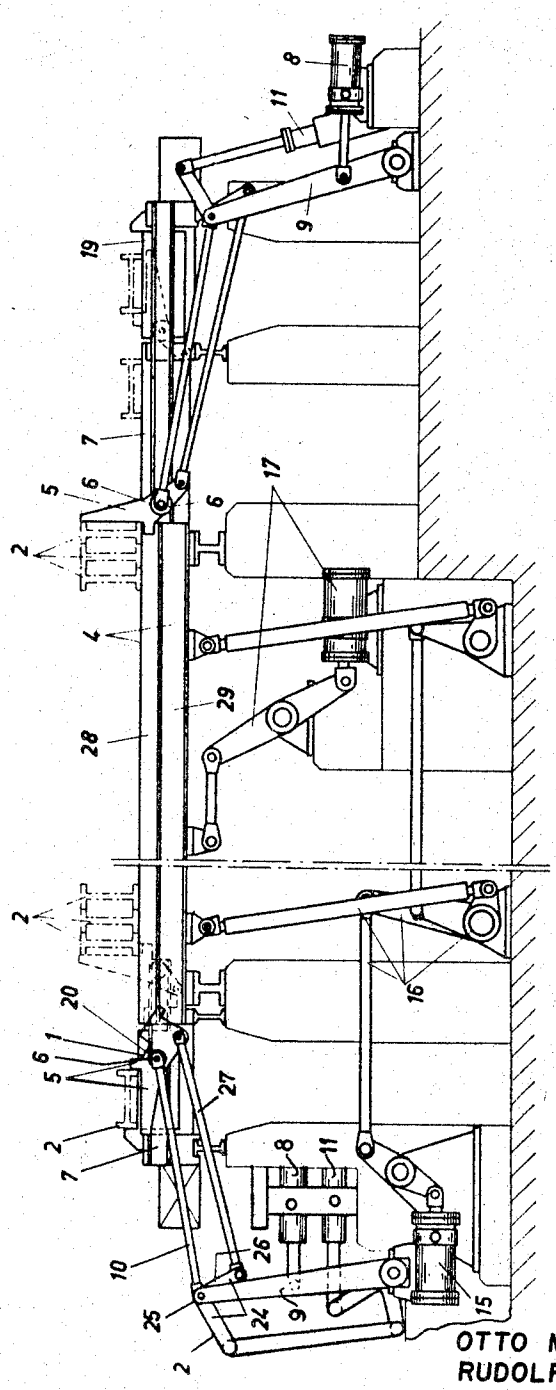
June 6, 1967 O. MÖDDER ETAL 3,323,632

APPARATUS FOR SETTING UP AND SHIFTING WORKPIECES

Filed Feb. 18, 1966 4 Sheets-Sheet 1

FIG. 1



INVENTORS
OTTO MÖDDER &
RUDOLF MÜLLER
Henry C. Westin
THEIR ATTORNEY

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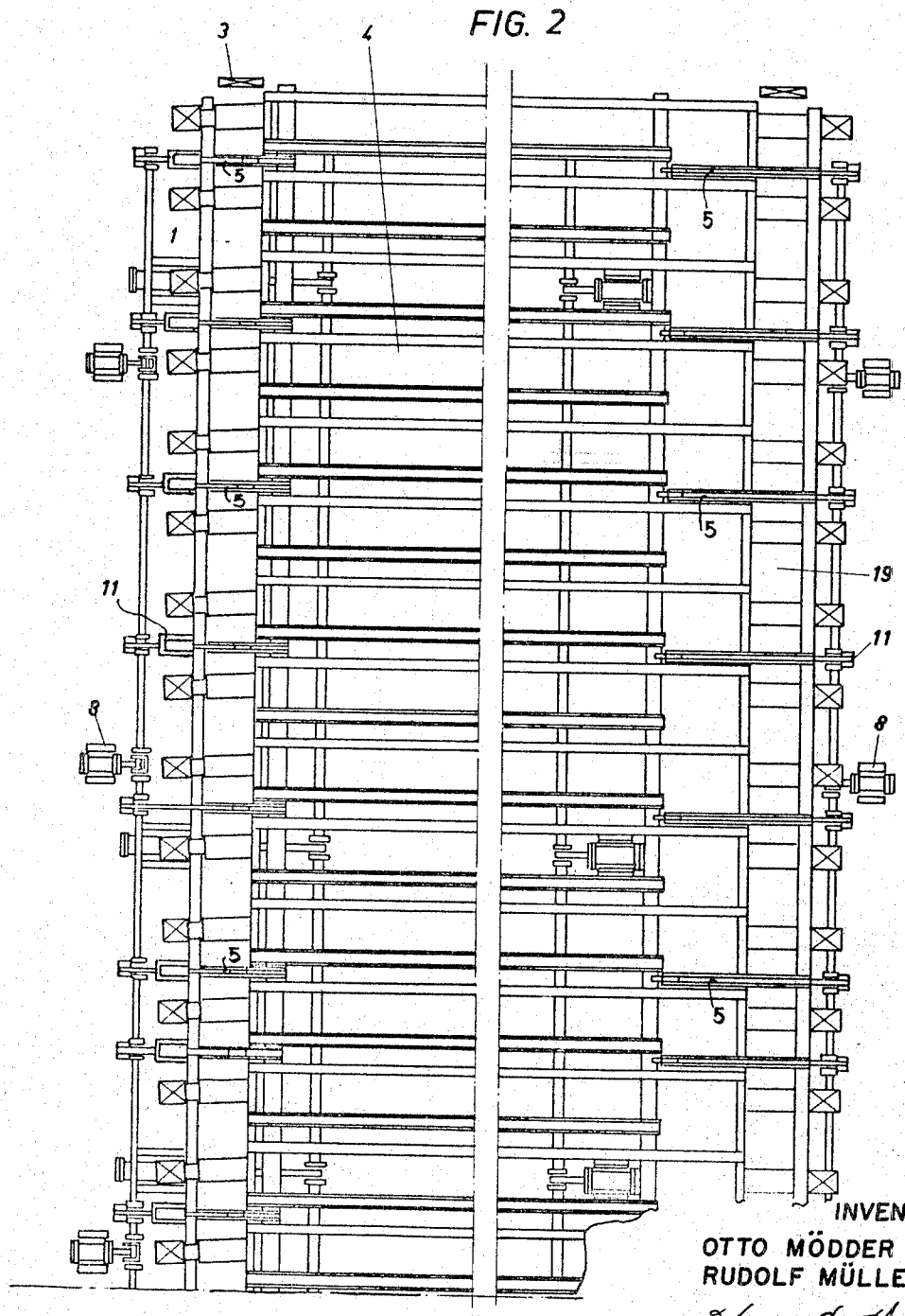
FIG. 2



INVENTORS
OTTO MÖDDER &
RUDOLF MÜLLER
Henry C. Westin
THEIR ATTORNEY

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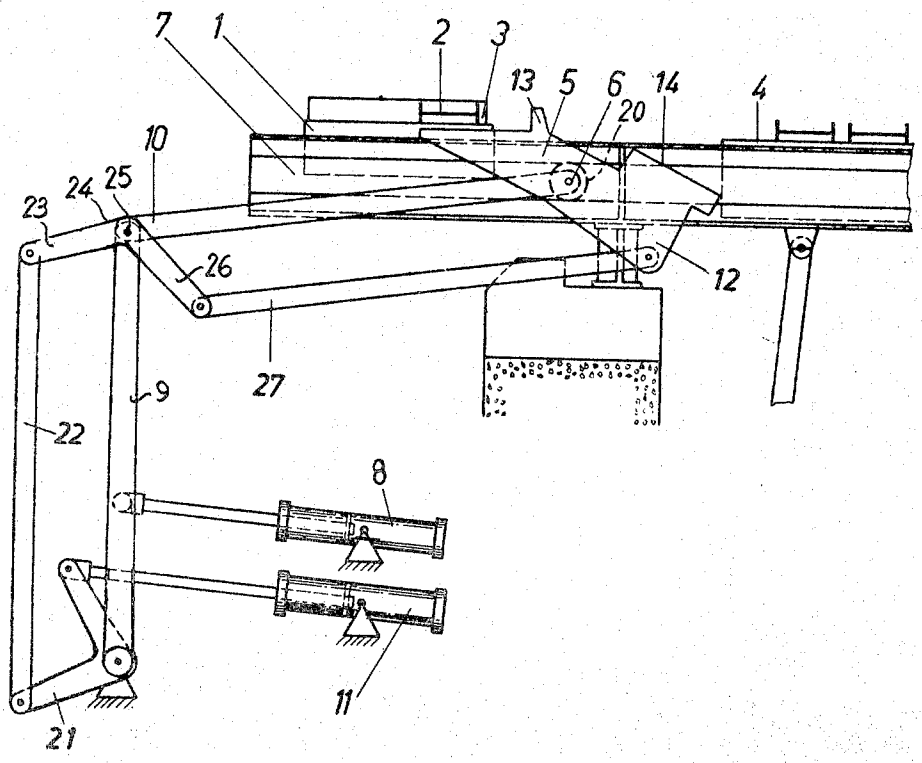
Fig. 3



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OTTO MÖDDER &
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Henry C. Westin
THEIR ATTORNEY

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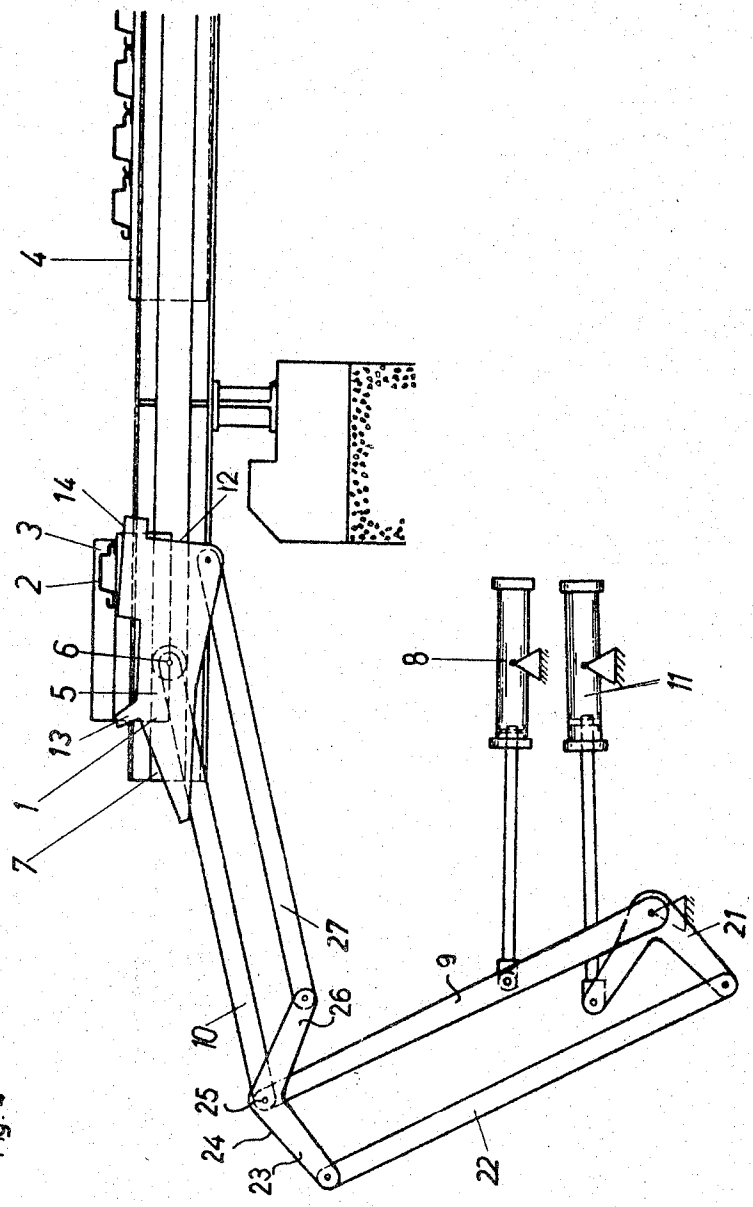

Fig. 4

INVENTORS
OTTO MÖDDER &
RUDOLF MÜLLER
Henry C. Westin
THEIR ATTORNEY

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APPARATUS FOR SETTING UP AND SHIFTING WORKPIECES

Otto Mödder and Rudolf Müller, Dahlbruch, Kreis Siegen, Germany, assignors to Siegener Maschinenbau G.m.b.H., a corporation of Germany

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4 Claims. (Cl. 198—27)

This invention relates to an apparatus for setting up and shifting rolled bars, especially sections, which apparatus is provided between a conveying roller table and a laterally arranged cross transfer such as a hot bed. The apparatus has a plurality of setting-up levers hinged to a horizontal shaft which grab the individual rolled bars in the lying down position and deposit them in the upright position on the hot bed.

So-called transfer devices on rolling mill hot beds are well known and have a rake characterized by a path of motion closed in itself. The rake lifts the rolled bars each time individually off the approach roller table and moves them further perpendicular to the table in the direction of the hot bed. It is prior art, furthermore, to associate laterally the end of the cross transfer away from the roller table with setting-up devices for sections which take the rolled bar lying in the last rake pocket over into angularly variable pockets acting as erecting levers which deposit the bar in an upright position on the hot bed. Such transfer devices which serve to set up rolled bars and shift them from the approach roller table to the hot bed are of relatively heavy and lavish construction and, therefore, are cumbersome and subject to wear during operation.

For the purpose of simplifying and increasing safety in operation of such setting-up and shifting apparatuses, it is also known to form the equipment for producing the vertical and horizontal motion of the conveying rake by means of a carriage or slide movable horizontally back and forth by hydraulically driven pistons on which there is rigidly mounted one or several hydraulically actuated pistons with a vertical direction of motion. Of the pistons working with a vertical direction of motion, at least one serves to raise and lower the rake that lift the rolled bars off the conveying roller table, while one or several others of these pistons serve to raise or lower, i.e. swing the erecting levers or pockets that are associated with the end of the rake away from the roller table. This setting-up and shifting device, too, is still relatively lavish and, therefore, costly in its construction. Furthermore, considerable building-in space is needed to house it.

In order for setting up and shifting apparatuses for rolled bars, especially rolled sections, to be still further simplified with respect to not only easy and manageable operation, but also with reference to requiring only a minimum of building-in space, provision is made according to an older suggestion for the setting-up levers to run with their swivel axis horizontally shiftable to stationary guides that extend beyond the width of the roller table and as far as the range of the cross transfer serving as hot bed. This guarantees an easy run of the setting-up and shifting apparatus and, also, it is possible to eliminate completely the transport rakes or the like which, with the known transfer devices, bridge the interval between the conveying roller table and the setting-up lever or pockets. This is accomplished by employing the erecting levers to both set up the rolled bars and, also, take over the shifting function for the rolled bars. The setting-up and shifting apparatus according to the older proposition offers in connection therewith a plurality of operating possibilities. Aside from setting up on the subsequently arranged hot bed the rolled bars that arrive in the lying

down position on the approach roller table, there is also the possibility of using the setting-up and shifting apparatus simply for the lateral shifting of sections located between roller table and hot bed, or conversely. Furthermore, the lying down rolled sections can be easily lifted off the approach roller table through the setting-up levers or pockets and then removed to the hot bed.

With this removal operation, however, it is not possible to deposit the sections, e.g. sheet piling sections, without an interval of space between the sections on the hot bed because the supporting lugs on the setting-up levers or pockets will not permit this. It is possible during simple shifting of the rolled sections from the approach roller table to the hot bed with the aid of the supporting lugs provided on the setting-up levers or pockets, to bring the rolled sections without an interval of space between them on the hot bed; however, it is not always desirable to push the sections laterally off the approach roller table. This applies particularly to the relatively heavy sheet piling bars, with which care must be taken that section edges are not deformed. It is possible, but only with great skill, to control the setting-up and shifting apparatus during delivery of the rolled sections in such a manner that the sections come to lie on the hot bed without interval of space between them and yet safely prevent damage to the edges of the bars by the supporting lugs of the setting-up levers or pockets.

The object of the invention is to improve the setting-up and shifting apparatus in such a manner that instead of shoving the bars off the approach roller table, they are lifted off without the supporting lugs of the setting-up levers or pockets interfering with the rolled sections being deposited on the hot bed and without an interval of space between the bars. This is accomplished according to the invention by extending the arms of the setting-up levers beyond the swivel axis of the setting-up levers so as to present a supporting edge for each rolled section. By swinging the setting-up levers into the lowering position, this edge can be lifted above the conveying plane of the rolled stock. By means of the additional supporting edges the rolled bars can be engaged on the approach roller table and slightly raised above the table, after which it is moved within the range of the hot bed by lateral movement of the setting-up levers. The rolled bar then is positioned and brought to rest immediately adjacent the last bar located on the hot bed. Damage to the bar edges cannot occur, even when the setting-up and shifting apparatus is moved beyond the minimum distance because the supporting edges slide away unobstructedly from below the rolled bar, till the apparatus comes to a stop. By a slight horizontal swing of the setting up levers, the additional supporting edges are lowered below the conveying plane, so that the bar will no longer contact them during the return stroke of the apparatus and it remains in its position on the hot bed.

Further developments and characteristics of the apparatus according to the invention will be dealt with hereinafter with reference to the following drawings of which:

FIGURE 1 is a sectional elevation view of the setting-up and shifting apparatus incorporated in a rolling mill hot bed;

FIGURE 2 is a plan view of the arrangement shown in FIGURE 1;

FIGURE 3 is an enlarged elevational view of the setting-up and shifting apparatus in an operating position with the arm of the setting-up lever associated with the supporting lug; and

FIGURE 4 is an enlarged elevational view illustrating the apparatus during operation with the arm of the setting-up lever extended beyond the swivel axis.

With reference now to the drawings, there is shown an approach roller table 1 for delivering the individual rolled bars 2 in the lying down position. The bars run up against a stop 3 where they are prevented from further movement.

The individual rolled sections 2 are transferred from the roller table 1 to a laterally arranged hot bed 4, by setting-up or erecting levers 5 which serve as a cross transfer and have their swivel axes 6 retained by means of rollers 20 in stationary guides 7. These guides are arranged perpendicular to and project beyond the width of the roller table where they extend into the zone of the hot bed 4. As shown in FIGURE 1, the erecting levers 5 have bar engaging surfaces in the form of an L as well as other surfaces referred to hereinafter. As shown in FIGURE 2, a lever 5 is provided at spaced intervals along the roller tables 1 and 19. The erecting levers 5, for the purpose of transferring the individual rolled bars 2, are moved in the guides 7 below the conveying plane of the approach roller table 1 between the table rollers and underneath the rolled bar 2. Thereafter the erecting levers 5 are lifted above the conveying plane of the roller table and transferred forward into the zone of the hot bed 4. During transfer the levers are so aligned that the rolled bar 2 taken from the approach roller table 1 in a lying down position is deposited in an erected position on the hot bed 4.

The erecting levers 5 are moved in the guides 7 by a shifting drive 8 consisting preferably of a piston cylinder assembly that is connected to a pivotally mounted rocking lever 9. This lever is connected by a coupling rod 10 with the swivel axis 6 of the erecting levers 5. The erecting levers are raised and lowered by a swing drive 11 also preferably consisting of a piston cylinder assembly. As shown in FIGURES 3 and 4 the drive 11 is connected to one end of a toggle lever 21 and the other end is secured to a coupling rod 22 that engages an arm 23 of another toggle lever 24. The toggle lever 24 is pivotally mounted by a pin 25 that also secures the rocking lever 9 to the coupling rod 10. The lever 24 has an arm 26 which is hinged to the one end of a push-and-pull rod 27. The other end of the rod 27 engages an arm 12 extended below the pivot 6 of the erecting levers 5. It is to be appreciated that the drive 11 is so associated with the drive 8 that it follows each swinging motion of the rocking lever 9 effected by the shifting drive 8. Thereby it is possible, in any shifting position of the erecting lever 5, to swing and/or lower the lever 5 at will.

The erecting levers 5 deposit the individual rolled bars 2 on stationary grates 28 of the hot bed 4, where stepwise transport throughout the length of the hot bed 4 is effected by lifting beams 29. These beams are connected by arms 16 to a drive 15 by which the beams are raised and lowered while at the same time the beams are shifted in a longitudinal direction by a pacemaker drive 17. From the delivered end of the hot bed 4, the individual rolled bars 2 are transferred to a runout table 19. For that purpose there is arranged between the hot bed 4 and the runout table 19 a setting-up and shifting device similar to the one between the approach roller table 1 and the entry end of the hot bed 4. The operating method of this setting-up and shifting device is, however, inverse to that of the setting up and shifting device between the approach roller table 1 and the entry end of the hot bed 4, i.e. the individual rolled bars 2 are removed from the hot bed 4 in the upright position and deposited in the lying down position on the runout table 19. The use of the setting-up and shifting apparatus developed according to the present invention with double-armed erecting levers 5 can be recommended here, too.

Ordinarily it will suffice to provide between the hot bed and the roller tables only one group of erecting levers 5. With an especially rapid succession of rolled bars, however, it is possible without anything further to provide several groups of erecting levers and couple them with

separate shifting drives 8 or the groups of levers may be connected to a drive that shifts them opposite to one another in an out of phase action. For this purpose the rocking levers 9 associated with the various groups of erecting levers 5 are mounted on different shafts that are also actuated through separate shifting drives 8. These separate shifting drives can be actuated independently or dependently whereby the rolled bars following each other in quick succession can be transferred between roller table and hot bed, or inversely. If provision is made for several e.g. two groups of erecting levers, it is desirable to arrange the erecting levers of the individual groups in turns next to one another, so that there are approximately equal intervals within the individual groups. The drive shafts associated with the individual rocking lever groups are preferably mounted one after another.

Normally, the rolled bars 2 arriving on the approach roller table 1 are seized by the erecting levers 5 in the manner shown in FIGURE 3, whereby the erecting levers 5 are moved into the roller table to a point where the section 2 come to rest against a supporting lug 13. Thereafter the erecting levers 5, through a swing motion produced by the push-and-pull rod 27 are raised to a point where they lift the rolled section 2 slightly off the roller table 1. The erecting levers 5 can then be shifted by the connecting rod 10 out of the range of the roller table 1 into the zone of the hot bed 4, on which the rolled section 2 is deposited by lowering of the erecting levers 5. Since the supporting lug 13 of each erecting lever 5 travels ahead of the rolled section 2, it is not possible to deposit the rolled sections 2 without a space interval between the bars on the hot bed 4. Moreover, this space between adjacent bars 2 will be equal to the width of the supporting lug 13.

The present invention also employs the setting-up and shifting apparatus to remove rolled sections 2 from the roller table 1 and deposit them side by side on the hot bed 4 without clearance between them. To accomplish this as shown in FIGURES 3 and 4, a supporting surface 14 is provided on the arm 12 of each erecting lever 5. The surface 14, as shown in FIGURE 4, is located in advance of the erecting levers 5, whereby the surface when placed under the rolled sections 2 located on the roller table 1 will then lift the rolled material above the conveying plane. Thereafter the erecting levers 5 are with the aid of the connecting rod 10 shifted laterally to transfer the rolled section on the supporting surface 14 in the lying down position to the zone of the hot bed 4. The rolled section can then be deposited directly next to the last rolled section on the hot bed 4, because there are no parts projecting beyond the supporting surface 14. Even in case of inaccurate control of the shifting movement, there will be no damage to the rolled sections, because the edges 14 can slide away unobstructed beneath the rolled sections. During the reversing motion of the erecting levers 5 the supporting surface 14 of the arms 12 can be lowered in such a way, by the pull-and-push rod 27, that they retract beneath the conveying plane and thereby are no longer in contact with the rolled sections 2.

According to the present invention a modification of the erecting levers 5 is accomplished to provide supporting lugs 13 which are employed when rolled sections are to be transferred to the hot bed 4 without clearance between the sections. During transfer of the rolled sections 2 by means of the supporting lugs 13, the edges of the rolled material which can be easily damaged are raised throughout the entire transfer path.

In accordance with the provisions of the patent statutes, we have explained the principle and operation of our invention and have illustrated and described what we consider to represent the best embodiment thereof. However, we desire to have it understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

We claim:

1. In combination with a conveying roller table for receiving rolled workpieces, such as rolled sections, and a cross transfer, such as a hot bed, arranged laterally of said conveying roller table onto which workpieces are individually transferred either to or from said conveying roller table,

an apparatus for shifting said workpieces between and above the conveying planes of said conveying roller table and said cross transfer comprising a plurality of rotatable workpiece engaging members having horizontally coaxially disposed pivots,

said members having a first workpiece engaging surface adapted to pick up individually workpieces arranged in a first position and rotate them relative to their longitudinal axes to a second position as, for example, from a lying down position to an upright position or vice versa,

said workpiece engaging members having a second workpiece engaging surface adapted to engage and pick up a workpiece above said conveying plane and transfer said workpiece without rotation thereof either to or from said conveying roller table,

stationary guides for carrying the pivots of said members in a manner to allow horizontal movement thereof towards and away from said cross transfer,

said guides being located beyond the roller table on the side thereof adjacent said cross transfer and said guides extending a distance approximately equal to the adjacent side of said cross transfer, and

power means connected to said members for horizontally and rotationally displacing said members relative to said guides.

2. In an apparatus according to claim 1 in which said

first workpiece engaging surfaces are disposed on one side of said pivots,

said second workpiece engaging surfaces being disposed of the opposite side of said pivots.

3. In an apparatus according to claim 1 in which said power means comprises a first power means connected to said pivots for horizontally displacing said members relative to said guides, and

second power means connected to said members for rotating said members about said pivots relative to said guides.

4. In an apparatus according to claim 3 in which said first power means includes a first piston cylinder assembly,

an arm connected to said piston cylinder assembly,

a connecting rod for interconnecting said arm and said pivots,

said second power means including a second piston cylinder assembly,

a lever interconnecting said second piston cylinder assembly with a second rod,

said second rod being coupled to said workpiece engaging members for effecting rotation movement thereof about said pivots.

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EVON C. BLUNK, *Primary Examiner.*

A. C. HODGSON, *Assistant Examiner.*