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E. HEIN

3,347,397

APPARATUS FOR THE TURNING OVER AND PILING OF ROLLED STOCK

Filed March 10, 1965

2 Sheets-Sheet 1

FIG. 1

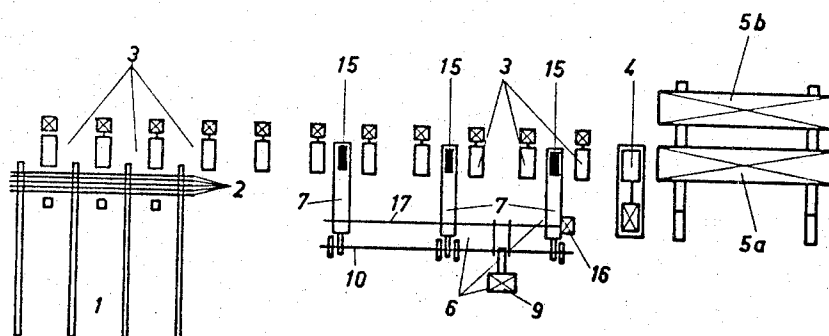
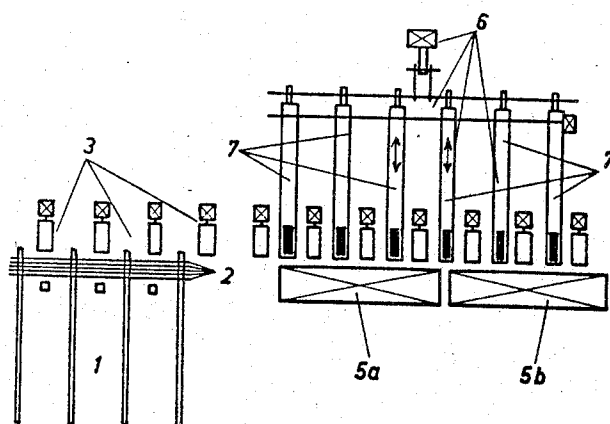


FIG 2



INVENTOR.
EWALD HEIN

BY

Henry C. Weston
HIS ATTORNEY

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E. HEIN

3,347,397

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2 Sheets-Sheet 2

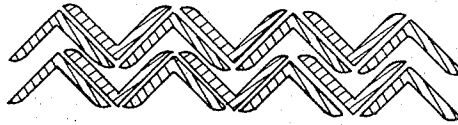


FIG. 4

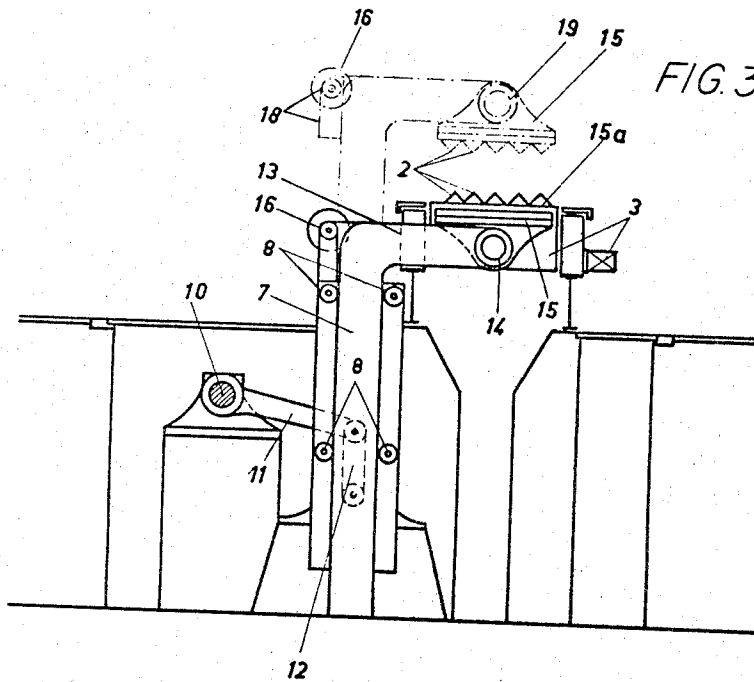


FIG. 3

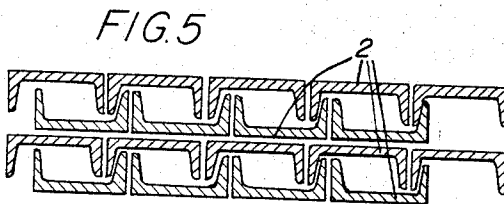


FIG. 5

INVENTOR
EWALD HEIN

BY

Henry C. Nestlin
HIS ATTORNEY

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3,347,397

APPARATUS FOR THE TURNING OVER AND PILING OF ROLLED STOCK

Ewald Hein, Siegen, Germany, assignor to Siegner Maschinenbau G.m.b.H., a corporation of Germany
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4 Claims. (Cl. 214-6)

ABSTRACT OF THE DISCLOSURE

This invention relates to an apparatus for the turning and piling of rolled stock, in particular rolled sections, in combination with a conveying means, e.g. a roller table, for feeding the rolled stock purposely in groups, and with grabbing elements for seizing the rolled stock, lifting it off the conveyor and turning it by 180°, thereafter depositing it again on the conveyor or directly on a piling table or the like.

Summary of invention

In the manufacture of rolled stock it is frequently necessary for the rolled stock which is cut to certain lengths to be turned over, i.e. brought into a position turned over by 180° in relation to the feed position. Also, it is frequently necessary to seize the rolled stock cut to certain lengths together in piles, i.e. by forming bundles or packets of rolled material. In sheet rolling, the individual sheets are turned over especially for the purpose of examining them on both sides for surface defects. Rolled sections, on the other hand, and especially L- or U-shapes, are turned over particularly for the purpose of forming piles or bundles of rolled material, which are then laid down on the stack. It has been shown that the bar stacks or bundles can be maintained compact during the transportation, when identical rolled sections are stacked on top of one another in layers in such a manner that at least in some of these layers the rolled sections receive in relation to the normal position a position twisted by 180° and thus can be deposited in grooves between adjacent sections of the other layers. The rolled sections thus engage into one another to a certain extent like gears and thus result in the desired cohesion in the stack or bundle.

Special devices have already become known for turning over both sheets and sections. Thus it is known, for instance, to guide the rolled stock on the approach conveyor between two arms, that can be swung jointly about a horizontal axis by 180° out of the conveying plane, thereby turning over the rolled material seized by them and depositing it in a zone adjacent to the conveying plane. It is known furthermore to turn the sheets over in such a manner that the latter by means of special arms are tilted at first by 90° out of the conveying plane and are then given over to other arms which perform an additional 90° movement and by means thereof bring the sheets into a position where they can be laid down. To turn over sections, it has been suggested furthermore to use tonglike grabbing elements that seize the delivered rolled sections individually, swing them above a piler and through opening of the tong drop them off there in the occasionally desired position. These known devices not only have a complicated setup, but also their operating method is circumstantial and time-consuming and they lack precision.

The purpose of the invention is to eliminate these drawbacks and the problem on which they are based, by the creation of an apparatus for the turning over and stacking of rolled material, especially sections, which makes possible the grabbing on one side only of the stock to be turned over and stacked, and despite thereof affords

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a sure hold of the stock while it is turned over. According to the invention this problem can be resolved essentially through the fact that the grabbing members are preferably magnets extending across the entire width of the conveyor, which magnets are movably mounted to raisable and lowerable jibs.

It is true that conveyors and pilers for sheets are known, which work with the aid of magnets, but they do not permit the rolled material to be turned over by 180° and be piled gently. Rather, the known apparatuses let the rolled material drop down from a considerable height upon the pile to be formed, so that in order to form a properly straightened stack, additional special auxiliary means are necessary in order to push the individual sheets onto the pile with their edges properly aligned.

A further development of the apparatus according to the invention consists of the fact that the grabbing members are displaceable between an end-position below and an end-position above the conveying plane. In this connection, the present invention provides for the adhering surfaces of the magnets in the end-position beneath the conveying plane to assume an upwardly directed position and form supporting surfaces for the rolled stock. In this way it is possible to move the grabbing members under the rolled material delivered on the conveyor, the rolled sections for instance, and then lift them up so that the rolled material is separated from the conveyor and supports itself on the adhering surfaces of the magnets. Still further, the invention provides for making the grabbing members horizontally movable exclusively in their end-position above the conveying plane, so that it is possible then to connect the magnets only in this upper end-position, in order to also secure the rolled material exactly in its position on the adhering surfaces of the magnets whenever the latter are swung out of their normal position by 180°. In this horizontal swing position of the magnets, the rolled material hangs freely on the grabbing members.

With apparatuses to turn over and pile rolled sections, especially L- or U-shapes, the present invention affords the special advantage that the magnets with downwardly directed adhering surfaces can be lowered to and secured at an adjustable distance above the conveying plane. After the magnets have been switched off, i.e. after the magnetism has been cancelled, the adhering surfaces of the magnets form a guide which prevents the rolled sections, which are brought into an unstable position through the 180-degree turnover, from tilting over during their further transportation on the conveyor.

An apparatus for the turning over and piling of rolled stock with the precedingly described setup is suitable especially for use in a conveying and piling plant for rolled material, where the piling tables or piling cars adjoin the rear end of the available conveying means, e.g. a roller table.

With apparatuses for the turning over and piling of rolled stock with piling tables or the like arranged laterally to the conveying means, the present invention affords the special advantage that the raisable and lowerable jibs in the zone between the conveying means and the piling tables or the like can be mounted transversely displaceable. It is then possible to lift the rolled material off the conveyor and eventually, after the turning over, deposit it directly onto the adjacent piling table or the like. With such apparatuses, moreover, it is also possible according to the invention to mount the raisable and lowerable jibs, at their end away from the grab members, movable round a common, horizontal axis in the zone between the conveying means and the piling table or the like. In this way the same result can be achieved.

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In the drawings, the object of the invention is illustrated by way of several embodiments of which:

FIGURE 1 is a schematic top view of an apparatus for the turning over and piling rolled sections with movable piling cars adjoining the conveying roller table;

FIGURE 2 is a schematic top view of an apparatus for turning over and piling of rolled sections with piling tables arranged laterally to the conveying roller table;

FIGURE 3 is a detailed cross section of the apparatus shown in FIGURE 1;

FIGURE 4 is a stack of roller material formed by a number of angular sections engaging in gear-like fashion; and

FIGURE 5 is a stack of rolled stock consisting of U-sections arranged in several layers on top of one another and in engaging gear-like or box-like fashion into one another.

According to FIGURES 1 and 3, rolled sections 2 to be piled shown supported by a transfer bed 1 are pushed by groups perpendicular to their longitudinal direction, onto a conveying roller table 3. The roller table 3 then conveys the rolled sections 2 in their longitudinal direction as far as the adjustable gauge or bumper 4 against which they contact, so that all rolled sections 2 in the group are aligned longitudinally in relation to one another. Arranged back of the gauge 4, perpendicular to the conveying direction of the roller table 3, are displaceable piling cars 5a and 5b, each of which can be moved back of the roller table 3, the aligned rolled sections 2, after lifting of the length-gauge 4, being then pushed into the piling cars. Depending on whether one layer of rolled sections 2 has been pushed onto one of the piling tables 5a or 5b, the latter is lowered enough so that a new layer of rolled sections 2, after alignment of the length-gauge 4, can run unobstructed onto this piling car, so that gradually a stack of rolled sections is being formed on said piling car. As soon as the stack of rolled sections on the one piling car, e.g. 5a, has reached the desired height, this piling car is moved out of the feed zone of the roller table 3, while at the same time the other piling car, e.g. 5b, comes into the feed zone of the roller table 3. In the meantime, while the finished stack of rolled material is being bundled on the piling car 5a and moved away, the other piling car 5b can be loaded up unhindered. This makes possible a continuous operation method of the piling apparatus.

In order to achieve inner cohesion of the stacks of rolled material and thereby facilitating their bundling and transportation, various layers of rolled sections 2 inside the stack are turned over by 180° from their normal position and laid down staggered somewhat laterally. This results in a somewhat gear-like intermeshing or em-boxing of adjacent rolled sections 2.

FIGURE 4 shows such a stack of rolled material formed of several layers of angular sections engaging gear-like into one another. The first, third, fifth, etc. layer is thereby laid down in its normal position, whereas the second, fourth, sixth, etc. layer, prior to its deposit, is turned over by 180° and displaced somewhat laterally. FIGURE 5 shows an emboxed stack of rolled material formed in a similar way and consisting of U-shapes. In order to obtain such an enmeshed position of the rolled sections 2 in the stacks, it is necessary for individual groups of rolled sections 2 to be turned over by 180° from their approach position on the conveying roller table 3. For that purpose a special turn-over gear 6 is associated with the conveying roller table 3.

One such turn-over gear 6 has several vertical beams 7, each of which move up and down between guides 8. As FIGURES 1 and 3 show, the up-and-down motion is imparted to all these beams 7 by a common motor 9 driving a shaft 10 on which rocker arms are mounted 11 which through a connecting member 12 are linked to the beams 7. Each one of the beams 7, which are arranged one after another along the conveying roller table

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3, carries at its upper end a jib-arm 13 that extends between two rollers. At the free end of this jib 13 there is movably suspended round a horizontal axle 14 a grabbing member 15 formed by a magnet that can be turned on and off, i.e. an electromagnet. A motor 16, commonly associated with all the grabbing members 15, serves to swing the grabbing members 15 round their pivots 14. By a shaft 17, that can be driven by the motor 16, the grabbing members 15 are displaced horizontally through worm gears 18 and 19.

Normally, the jibs 13 carrying the grabbing members 15 are in such a lowered position that they lie below the conveying plane of the roller table 3, as shown in FIGURE 3. In connection therewith the grabbing members 15 have a swing position in which the adhering surfaces 15a of the magnets are directed upwardly and also are located somewhat below the conveying plane of the roller table 3. However, if the rolled sections 2 are to be turned over by 180° from the normal position indicated by solid lines in FIGURE 3 and then conveyed further in this turned-over position, the motor 9 is so driven that through the beams 7 the jibs 13 together with the grabbing members 15 are moved upwardly. In connection therewith the adhering surfaces 15a of the grabbing members 15 strike from below against the rolled sections 2 and lift them off the roller table 3 to the position indicated in phantom in FIGURE 3. In this position the magnets of the grabbing members 15 are switched on and through the arising magnetic field the rolled sections 2 are immovably secured to the adhering surfaces 15a. Thereafter, the motor 16 is turned on, which through the shaft 17 and the worm gears 18 and 19 displaces all grabbing members 15 by 180°, so that they arrive on the jibs 13 in the dot-and-dash position of FIGURE 3. The rolled sections 2 have thereby been brought into a position reversed in relation to the normal position. Thereupon the motor 9 is switched to lowering, so that through the shaft 10 and the rocker arms 11 and beams 7 are again shifted downwardly. As soon as the rolled sections 2 come into contact with the conveying roller table 3, the motor is switched off and the magnets of the grabbing members 15 become ineffective. The rolled sections are then in this position transported further by the roller table and after alignment at the length-gauge 4 they are pushed onto one of the piling cars 5a and 5b. In order that the rolled sections 2 will not, due to the unstable state of equilibrium, tilt over in an undesirable manner, the adhering surfaces 15a of the grabbing members 15 are kept so close above the conveying plane of the roller table 3 that the rolled sections 2 are safely guided thereon.

After removal of the rolled sections 2 the turn-over gear 6, prior to the start of a new working position drawn in solid lines in FIGURE 3. After the introduction of each working cycle for the turn-over gear 6 through manual control, the entire subsequent control can occur fully automatically, e.g. with the aid of a program switch gear and through a limit switch.

The apparatus for the turning over and piling of rolled stock according to FIGURE 2 differs from the one according to FIGURE 1 through the fact in the first place, that in lieu of the piling cars 5a and 5b adjoining the roller table 3, piling tables 5a and 5b are being used, which are set up laterally along the roller table 3. In order to be able to charge these piling tables 5a and 5b with rolled sections, the jibs 13 with the turn-over gear 6, as distinct from FIGURE 3, are guided on the beams 7 transversely shiftable. The cross adjustment of the jibs 13 is in connection wherewith effected through a common drive. For the rest, the setup of the turn-over gear 6 can be the same as the one according to FIGURE 3. The difference in the working method lies only in the fact that the grabbing members 15 seize each group of rolled sections and through cross shifting of the jibs 13 they must transfer it to one of the piling tables 5a or 5b. In connection there-

with it is necessary, for the delivery of the rolled sections 2 in normal position, to let the grabbing members 15 attack from above, whereas a delivery of rolled sections 2 in a turned-over position necessitates during the lifting off the roller table 3 the attack of the grabbing members 15 from below.

With a deviating embodiment of an apparatus according to the invention it is possible to mount the jibs 13 on the beams 7 not transversely shiftable, but movable round a common horizontal axle, without there occurring an essentially different effect. In another form the motor 16 can be utilized simultaneously for the displacement of the jibs 13 and the horizontal swing of the grab members 15, but the result will be a motional dependence between these parts. It is also possible, of course, to utilize the described apparatus for the turning over and piling of sheets.

In accordance with the provisions of the patent statutes, I have explained the principle and operation of my invention and have illustrated and described what I consider to represent the best embodiment thereof. However, I 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.

I claim:

1. An apparatus for transferring workpieces for arrangement into a compact pile wherein the workpieces have open portions, in combination

a conveyor for transporting a number of the workpieces in group fashion with the open portions always having the same relationship to the conveyor and each other, to a predetermined position and in a manner that a portion of the underneath surfaces of the workpieces are exposed,

a gripping member comprising a workpiece magnetic gripping head having a workpiece engaging surface adapted to be brought beneath the underneath surfaces of the workpiece and being of sufficient dimension transverse of the path of travel of the workpiece to engage a group thereof supported by said conveyor,

a column member arranged on one side of said conveyor and connected to said gripping head for raising said gripping head from a position beneath the workpiece to lift the workpiece off said conveyor,

means for moving said column member vertically relative to said conveyor,

an arm carried by said column member and including a trunnion for rotatably supporting said gripping head, and

means for selectively positioning said head in a first position wherein a group of workpieces can be removed in the same position the open portions thereof assume when supported by said conveyor and a second position wherein the open portions of a group of workpieces are rotated 180° by the gripping head before piling thereof takes place.

2. An apparatus according to claim 1 including means for positioning said gripping head in a manner that its workpiece engaging surface is arranged closely adjacent the upper surfaces of said workpieces and serves as a guide for the group of workpieces to prevent them from tilting before piling thereof takes place.

3. An apparatus, according to claim 1, wherein a piling table is arranged laterally of said conveyor and said column member is mounted transversely shiftable in the zone between the conveyor and said piling table.

4. An apparatus, according to claim 1, wherein a piling table is arranged laterally of the conveyor and said column member at its end away from the gripping member is movably mounted about a common, horizontal axis in the zone between the conveyor and the piling table.

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ROBERT G. SHERIDAN, *Primary Examiner.*

GERALD M. FORLENZA, *Examiner.*

J. E. OLDS, *Assistant Examiner.*