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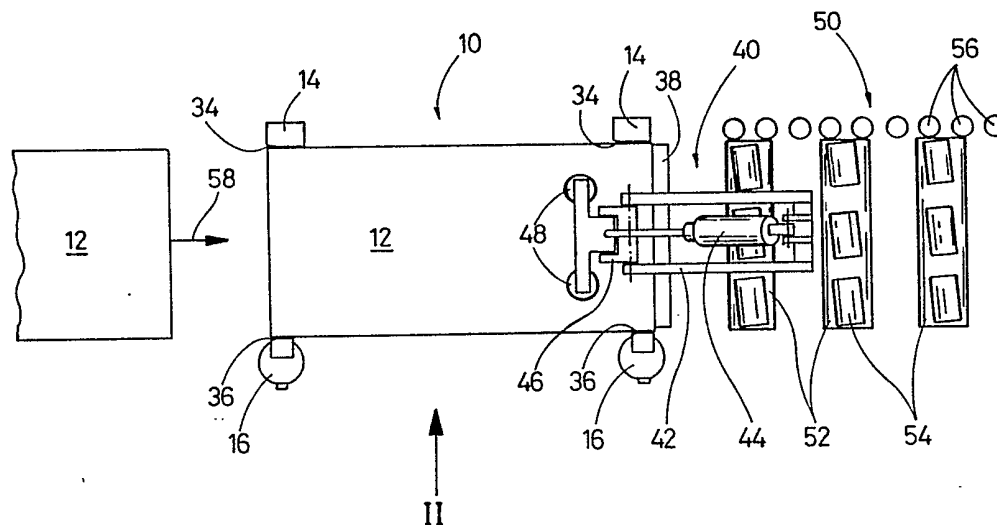
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(54) Magazine for stacking sheet-metal members, for example for the production of cans

(57) One column (16) of each of two pairs of columns (14,16) on which mutually remote edges of the sheet-metal members 12 are guided, has resiliently flexible means to exert a resilient pressure on the associated edges of the sheet-metal members (12) stacked between this column (16) and a rigid column (14) situated opposite. The flexible means may be a plurality of pressure members (20) disposed one below the other and individually resiliently supported. As a result, the sheet-metal members (12) are kept snugly against the opposite rigid columns (14) and so precisely positioned ready for destacking; at the same time, however, individual sheet-metal members (12) are prevented from being loaded with excessively great spring forces.

Fig. 1



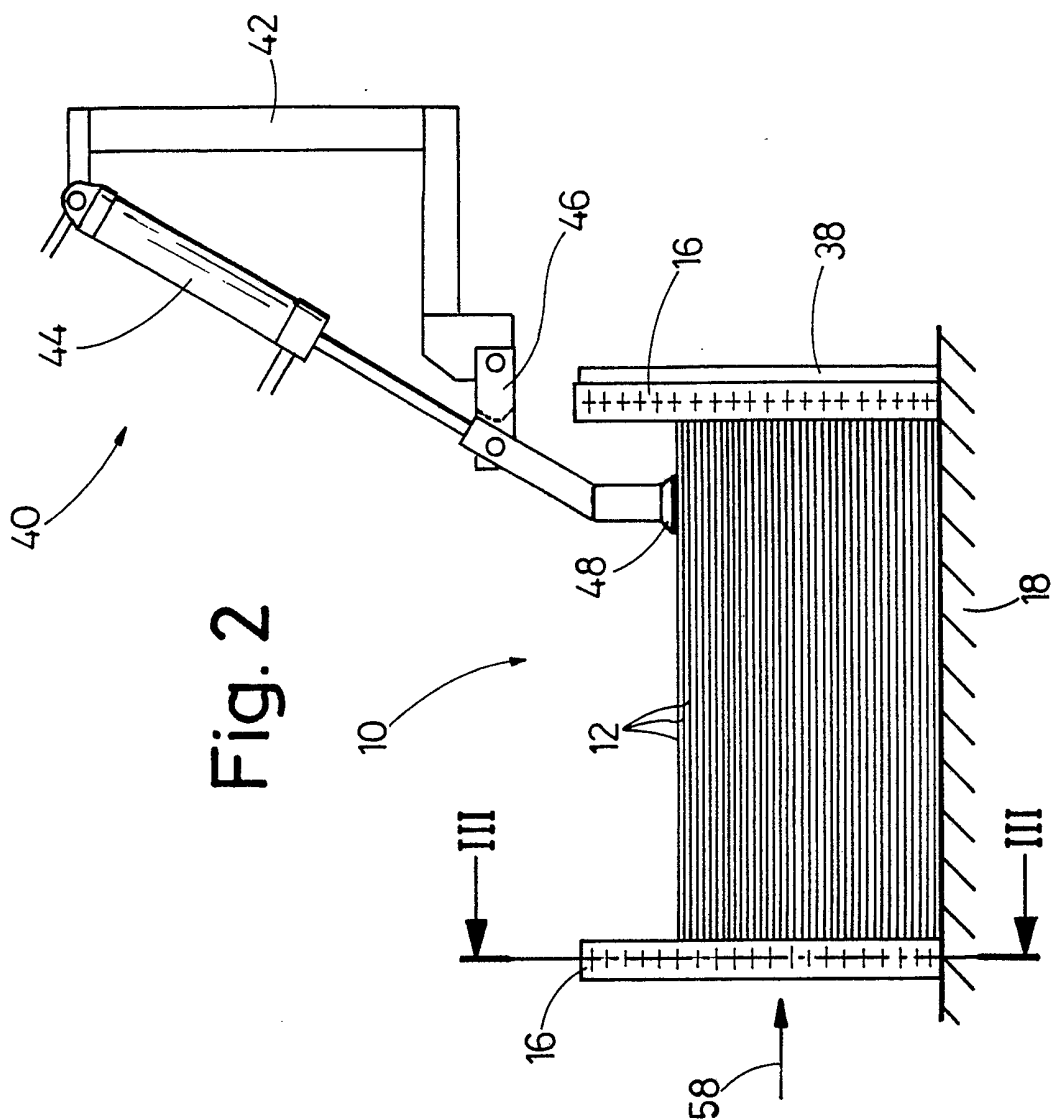


Fig. 3

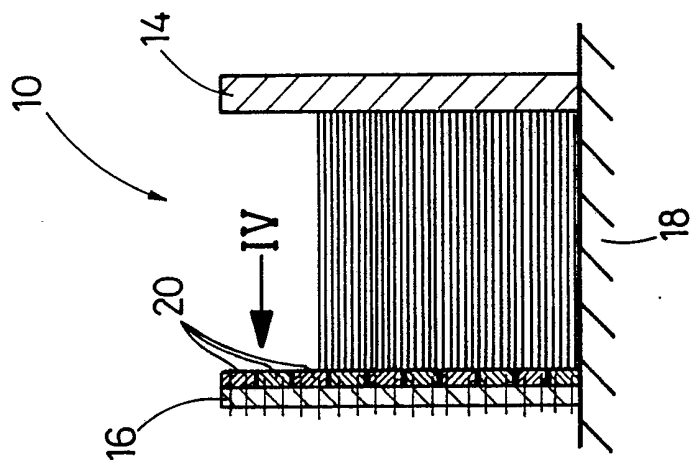


Fig. 5

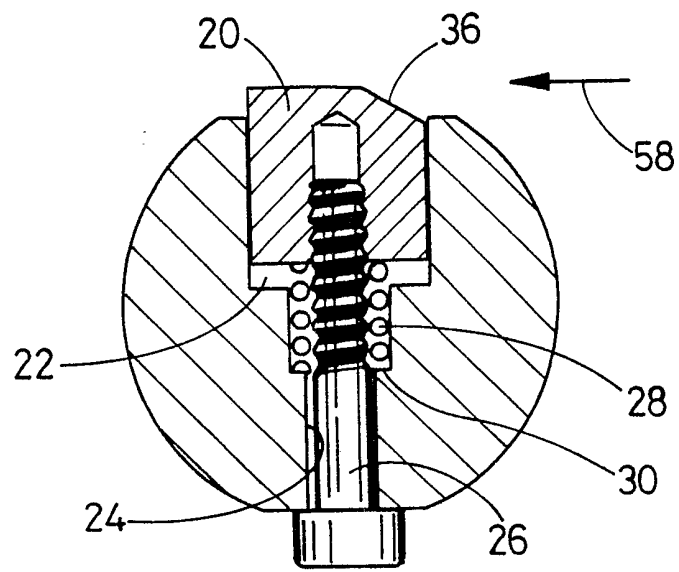
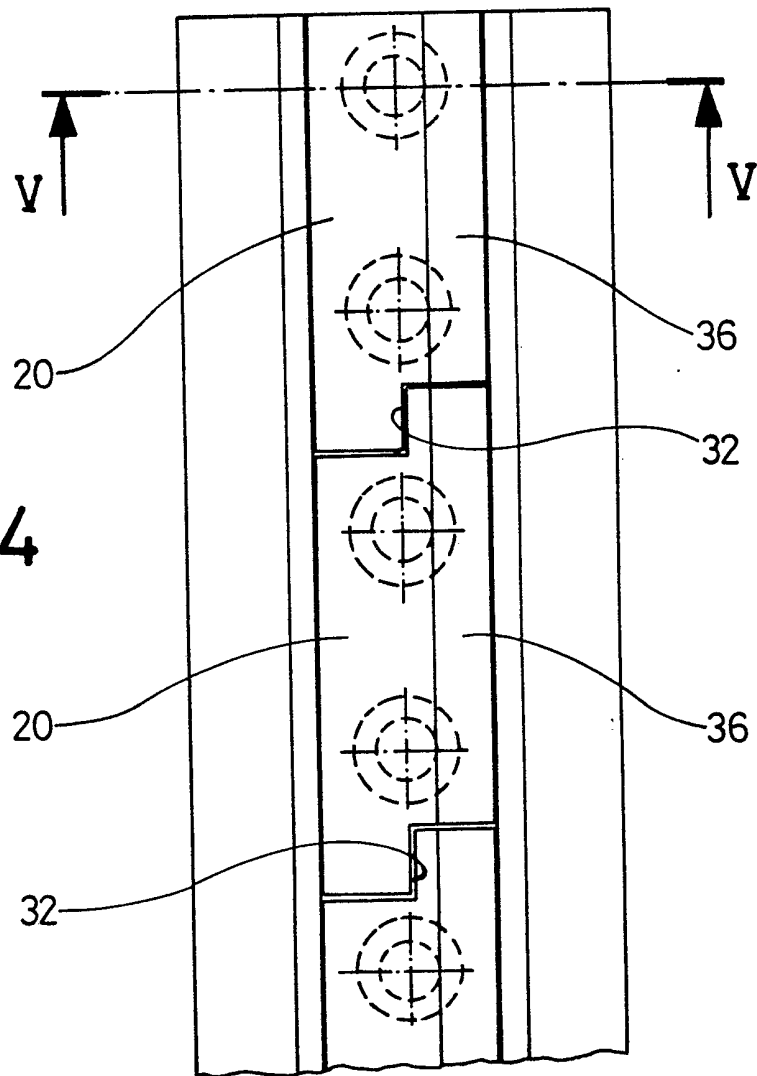


Fig. 4



SPECIFICATION

Magazine for stacking sheet-metal members, for example for the production of cans

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The invention relates to a magazine for stacking sheet-metal members, for example for the production of cans, having columns against which mutually remote edges of the sheet-metal members are guided.

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Such magazines are used, for instance, in the apparatus described in the earlier patent application GB 86.05988, on welding machines for welding tongues onto sheet-metal members which are subsequently processed to form cylindrical can bodies. In magazines of this type for these and other uses it is important that they should be able to be loaded with stacks of sheet-metal members in a simple manner and should keep these members in a precisely defined position in such a manner that they can be removed individually by means of a destacker working automatically and be deposited in an equally precisely predetermined position at one side of the magazine, for example on a conveyor along which they are taken for further processing. On the other hand, a free space must be provided between the columns of a magazine of this type, which space is greater, by a give tolerance range, than the space requirements of the stack of sheet-metal members which is to be introduced into the magazine. Certain tolerances result already during the cutting or punching to size of the individual members and in addition, some lateral offsetting of the members in relation to one another cannot always be completely avoided when stacking them.

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It is an object of the invention to provide a magazine of the type already described which, despite such inaccuracies, it is able to keep the individual sheet-metal members stacked in a more closely predetermined position ready for destacking.

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According to the invention, there is provided a magazine for stacking sheet-metal members, for example for the production of cans, comprising spaced parallel supports on which mutually remote edges of the members are guided, and at least one of the supports comprises resiliently flexible means to exert a pressure on the associated edges of the sheet-metal members stacked between said at least one support and an opposite, rigid support.

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Preferably, the resiliently flexible means are arranged in a strip-like form.

In the case of sheet-metal members which are not too thin in relation to their surface measurements and accordingly have an adequate stiffness, it may be sufficient if the resiliently flexible means exerts a lateral pressure on the stack of sheets which is substantially independent of its height. If the individual members are comparatively thin, however, and can accordingly be bent easily, which applies to the majority of can sheets, a substantially constant force exerted on the stack of sheets might be too great when the greater part of the stack has been used and the last sheet-metal member remaining in the magazine is ultimately loaded with the whole pressure.

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In order to avoid this, it is preferably arranged that

the resiliently flexible means is divided into a plurality of pressure members which are disposed one below the other and are individually resiliently supported.

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In this case, it is an advantage if the resiliently flexible means are in a strip-like form that the pressure members are received in a common vertical groove in an associated columnar support.

In order to avoid the possibility that the sheet-metal members might be caught in joints or gaps between the individual pressure members, it is further an advantage if the pressure members have surfaces deviating from the horizontal at their adjoining ends.

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By way of example an embodiment of the invention is described below, with further details, with reference to the accompanying drawings, in which:

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Figure 1: shows a plan view of a magazine according to the invention with associated devices for conveying onwards sheet-metal members from the magazine,

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Figure 2: shows a side view in the direction of the arrow II in Figure 1,

Figure 3: shows the vertical cross-section III-III in Figure 2,

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Figure 4: shows a partial view in the direction of the arrow IV in Figure 3, and

Figure 5: shows the partial section V-V in Figure 4.

In Figures 1 to 3, a magazine 10 is illustrated which contains a stack of rectangular sheet-metal members 12, for example of tin plate 0.2 mm thick. The magazine 10 includes two one-piece columns 14 of substantially rectangular cross-section and two multi-part columns 16 of substantially circular cross-section. All the columns 14 and 16 extend vertically upwards from a common base plate 18; the two multi-part columns 16 are adjustable according to the width of the sheet-metal members 12.

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Each of the two multi-part columns 16 comprises a plurality of pressure members 20, ten in the example illustrated, of substantially rectangular cross-section in horizontal planes, which are disposed one above the other, without any gaps, in a vertical groove 22 within which they are displaceable horizontally, towards and away from the one-piece column 14 situated opposite. Two radial bores 24 disposed vertically one above the other lead into the vertical groove 22 behind each of the pressure members; guided in each of these bores is a screw 26 which is screwed to the associated pressure member and limits its movement towards the opposite column 14.

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Each of the screws 26 is surrounded by a helical compression spring 28 which is installed, with preloading, between the associated pressure member 20 and a shoulder 30 of the associated bore 24. Thus each pair of associated compression springs 28 tends to urge the associated pressure member as far as possible out of the vertical groove 22 in the multi-part column 16 in question towards the opposite one-piece column 14.

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The pressure members 20 are stepped at their ends situated one above the other in such a manner that there they each comprise a vertical face 32 which lies in the common plane of the axes of the screws 26, as can be seen from Figure 4. This stepped formation reliably prevents the sheet-metal members 12 from

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penetrating into the joints between the pressure members and becoming caught there. The pressure members are not, however, prevented by this stepped formation from resilient movements independent of one another in the axial direction of the associated screws 26.

The magazine 10 is open at its left-hand side in Figures 1 and 2. In order to facilitate pushing in a stack of sheet-metal members 12 from the left, the one-piece columns 14 each have a chamfer 34; a chamfer 36 is formed on each of the pressure members 20 in a corresponding manner. At the right-hand side in Figures 1 and 2, the magazine is closed by a stop 38 in the form of a vertical plate.

Associated with the magazine is a destacker 40; this includes a frame 42 which is movable vertically up and down and horizontally backwards and forwards in the longitudinal direction of the sheet-metal members 12. Mounted on the frame 42 to be pivotable in the vertical central longitudinal plane of the magazine, parallel to the plane of Figure 2, at the top is the cylinder of a pneumatic piston-cylinder unit 44 and further down the frame is a link 46. The piston rod of the piston-cylinder unit 44 is mounted on the link 46 and has a pair of suction devices 48 secured to it. In Figures 1 and 2, the destacker is illustrated in a position in which its two suction devices are in the process of grasping the uppermost sheet-metal member in the magazine.

The destacker 40 is followed by a roller conveyor 50; this includes lower rollers 52 and upper rollers 54 each of which can be driven in rotation about a horizontal axis, the axes of the upper rollers 54 extending obliquely to those of the lower rollers 52. The roller conveyor 50 is bounded towards one side by lateral rollers 56, the axes of which lie in a vertical plane parallel to the central longitudinal plane of the magazine 10.

In Figure 1, an arrow 58 indicates that the magazine 40 is loaded with a stack of sheet-metal members in that this stack is pushed from the left in between the pairs of columns 14 and 16 as far as the stop 38. During the introduction of the stack, the pressure members on the two columns 16 are forced back somewhat as a result of which the initial loading of the compression springs 28 is correspondingly intensified. The sheet-metal members are thereby urged towards the opposite, rigid columns 14 by the pressure members held in a precisely predetermined position as a result. The screws 26 which limit the spring displacement of the uppermost pressure member 20 on each of the two columns 16 are preferably adjusted so that these two pressure members bear almost, or completely, without pressure against the upper sheet-metal members of those stacked or even leave these a very small clearance and so do not hamper the removal of the members.

In the destacking, the sheet-metal members are removed individually, as the suction devices 48 execute an arcuate movement upwards each time the piston-cylinder unit 44 moves in. During these movements the front edge of the sheet-metal member in question is displaced somewhat away from the stop 38 and is finally lifted away above the stop. The separation of the individual sheet-metal members is pro-

moted by known means, for example by like magnetization of superimposed edges of the members and/or by a stream of air directed against these edges.

Each sheet-metal member, after being lifted away over the stop 38 by the destacker 40, is subsequently lowered in such a manner that it comes between the rollers 52 and 54 of the roller conveyor 50 and is grasped and conveyed further by these. Thanks to their precise positioning in the magazine, the sheet-metal members reach the roller conveyor in a precisely predetermined position in which they have only a very short spacing from the lateral rollers 56. As the members are conveyed onwards the inclined upper rollers 54 have the effect of ensuring that the members bear against the lateral rollers 56 after a very short conveying distance and, as a result, are positioned for further processing, for example for the provision of longitudinal scorings which define a tear-off strip.

CLAIMS

1. A magazine for stacking sheet-metal members, for example for the production of cans, comprising spaced parallel supports on which mutually remote edges of the members are guided, and at least one of the supports comprises resiliently flexible means to exert a pressure on the associated edges of the sheet-metal members stacked between said at least one support and an opposite, rigid support.

2. A magazine according to Claim 1 wherein the resiliently flexible means are arranged in a strip-like form.

3. A magazine as claimed in Claim 2, wherein the strip-form resiliently flexible means comprises a plurality of pressure members disposed one below the other and being individually resiliently supported.

4. A magazine as claimed in Claim 3, wherein the pressure members are received in a common vertical groove in an associated rigid backing member.

5. A magazine as claimed in Claim 3 or Claim 4, wherein the pressure members have adjoining ends that comprise surfaces deviating from the horizontal.

6. A magazine for stacking sheet-metal members, constructed and arranged for use and operation substantially as described herein with reference to the accompanying drawings.