March 18, 1952 C. HERZOG 2,589,379

PROCESS AND DEVICE FOR THE MANUFACTURE OF CORRUGATED SHEETS OF ASBESTOS CEMENT

Filed Feb. 4, 1949 3 Sheets-Sheet 1

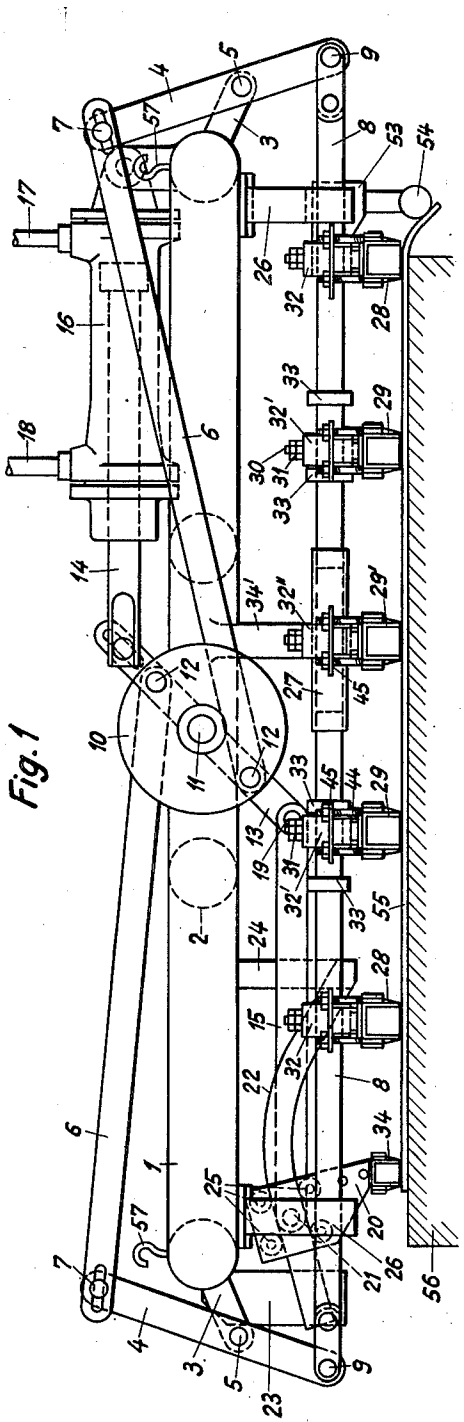


Fig. 1

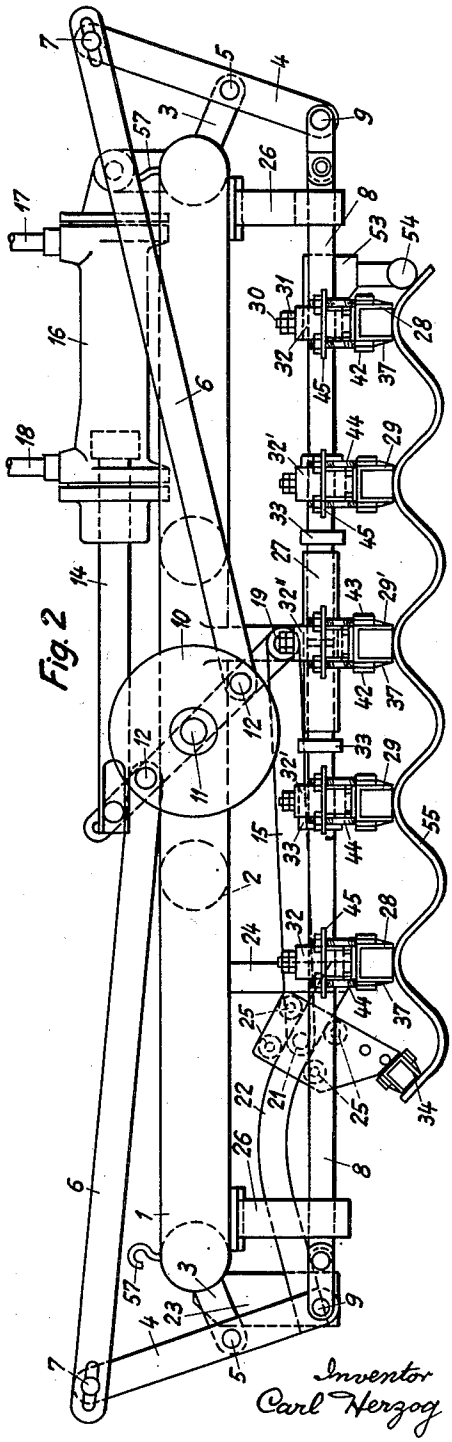


Fig. 2

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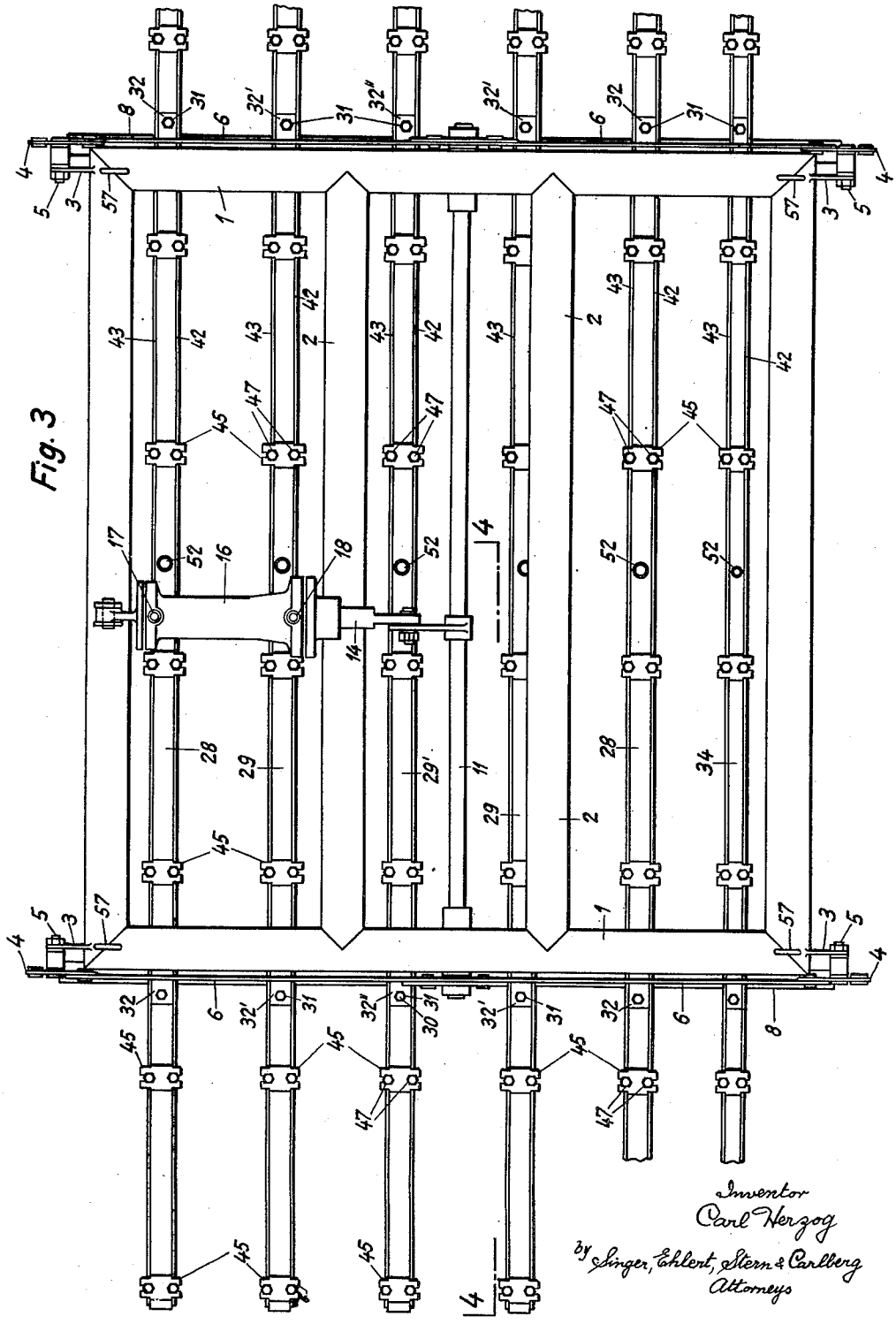
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Fig. 3



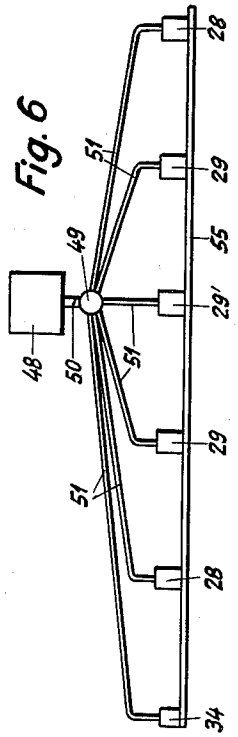
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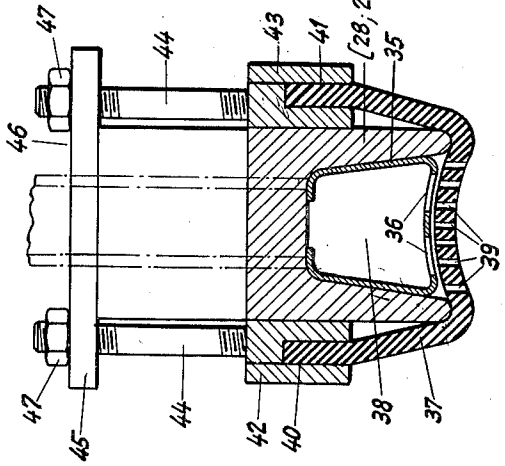
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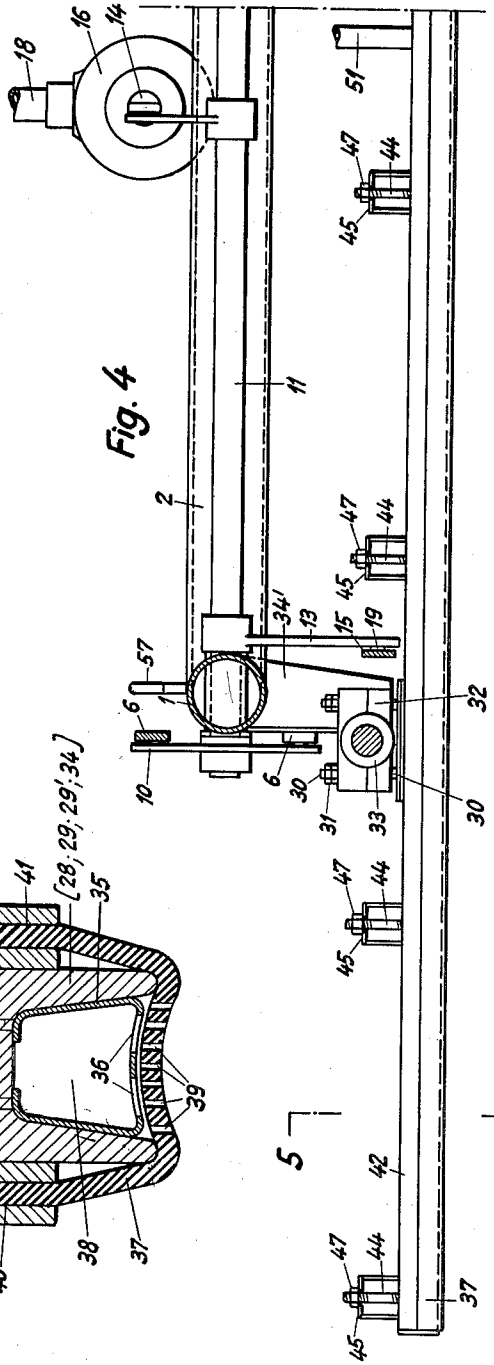
PROCESS AND DEVICE FOR THE MANUFACTURE OF CORRUGATED SHEETS OF ASBESTOS CEMENT

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3 Sheets-Sheet 3







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PROCESS AND DEVICE FOR THE MANUFACTURE OF CORRUGATED SHEETS OF ASBESTOS CEMENT

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7 Claims. (Cl. 154—30)

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The present invention relates to a process and a device for the manufacture of corrugated sheets from asbestos-cement sheets or other plastic, that is mouldable sheets containing fibres and hardening bonding agents. The new process consists in this that the mouldable sheets are, at definitely spaced intervals, subjected to the action of suction chambers, gripped, and then formed into corrugations by decreasing the distance separating the suction chambers. The flat sheets may be so edge-trimmed before the operation of corrugation that after said operation they exhibit the exact dimensions desired, since they are so held by the suction chambers that they do not become distorted. The corrugated sheets can then be placed on rigid moulds and remain there until the bonding agent has hardened sufficiently.

To perform the process a device is used which possesses suction chambers arranged at definitely spaced intervals, which suction chambers grip the sheets and fold them into corrugations of the desired width and depth. The sheets so corrugated are then placed in suitable corrugated moulds until they have set.

The annexed drawing diagrammatically illustrates the process.

Fig. 1 is an elevation of a preferred embodiment of the device according to this invention,

Fig. 2 is an elevation in another position of the various parts,

Fig. 3 is a plan view of the device,

Fig. 4 is a transversal section along the line 4—4 of Figure 3,

Fig. 5 is a section along the line 5—5 of Figure 4 and

Fig. 6 is a diagrammatic representation of the device.

The device for performing the process according to this invention comprises a frame 1 of rectangular shape which is reinforced by means of struts 2. The frame 1 and the struts 2 as well are advantageously made of steel tubes. To the frame 1 brackets 3 are secured on which double armed levers 4 are rotatably mounted by means of bolts 5. The upper ends of the levers 4 are connected to rods 6 by means of a bolt-and-slot connection 7, whereas the lower ends of the said levers 4 are connected to rods 8 by means of bolts 9. As shown in Figure 3 identical parts are arranged at opposite ends of the frame 1. The inner ends of the rods 6 are rotatably connected to a disc 10 which is itself rotatably mounted on the axis 11. The connection of the rods 6 and the disc 10 is brought about by means

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of bolts 12. To the disc 10 an arm 13 is fixedly secured. This arm projects beyond the disc 10 and its ends are connected to rods 14 and 15. The rod 14 is the piston rod of a hydraulic or pneumatic steering apparatus 16 provided with an inlet 17 and an outlet 18 for the pneumatic or hydraulic medium.

The lower end of the arm 13 is connected to the rod 15 by means of a bolt 19. The other end of the said rod is rotatably connected to a support 20 by means of a stud 21, the said support 20 being slidably mounted on a curved rail 22 fixed to the brackets 23 and 24 by means of rollers 25.

The rods 8, two of which are provided for at each end of the frame 1, are slidably mounted in brackets 26 secured to the frame 1 and their inner ends enter a cylinder tube 27. To the rods 8 U-shaped suction channels or chambers 28, 29 and 29' are suspended by means of bolts 30 secured to brackets 32. The upper ends of the bolts 30 are screw threaded and nuts 31 bearing against the upper side of the said brackets secure the bolts 30 and the suction channels in their position. The brackets 32 are fixedly secured to the rods 8, whereas the brackets 32' are arranged slidably between the collars 33 of the rods 8. The distance between the collars 33 corresponds to half the way of the rods 8 upon movement of the levers 4. A further bracket 32'' is fixedly secured to the frame 1 by means of a strut 34' which supports also the tube 27. The bracket 32'' is therefore not affected by the movement of the rods 8.

The support 20 is supporting a suction chamber 34.

Figure 5 shows a section through any one of the suction chambers 32, 32', 32'' or 34. A casing 35 of sheet metal is placed in the cavity 38 of the chamber formed by a channel-shaped element, this casing being provided with openings 36. A cover 37 of flexible, elastic material, for instance of rubber is arranged around the lower part of the channel-shaped element. Below the cavity 38 of the chamber the cover 37 is perforated (openings 39) and its borders 40, 41 are fixed in ledges 42, 43 to which screw bolts 44 are secured. These bolts enter into openings of the horizontal part 45 of the supporting element 46, the vertical part thereof resting on the channel element. By means of the nuts 47, the bolts 44 and the supporting element 46, the elastic rubber cover 37 can be kept taught around the lower part of the channel element.

As shown in Figure 3 the cover is secured to the channel element at various points.

An air pump **48** is diagrammatically represented in Figure 6 of the drawings. This pump or exhauster is connected to a central cock **49** by means of a tube **50**. The cock **49** in turn is connected by flexible tubes or hoses **51** to openings **52** (Figure 3) of the various channel elements.

The rod **8** shown on the righthand side of Figures 1 and 2 carries a support **53** provided at its lower end with a roller **54**, the length of which corresponds to that of the various channel elements.

The device is operated as follows:

A sheet of not yet hardened asbestos-cement **55** of rectangular or square shape is placed on a table **56** so that one margin of the same is below the roller **54** and is depressed by the same (Figure 1). Then the pump **48** is set to work so as to suck air out of the spaces **37** and thereafter the steering or control apparatus is operated so as to move the piston rod **14** to the lefthand side (see Figures 1 and 2). This movement entails a rotation of the discs **10** at both ends of the frame **1** and the rods **8** are moved towards each other by the rods **6** and the levers **4**.

The channel elements **28** are displaced by an amount corresponding to the stroke of the rods **8**. The inner channel elements **29** are only set into movement when the outer collar **33** abuts against the same and they are displaced a distance equal to half the stroke of the rods **8**. The innermost channel element **29'** remains at rest whereas the channel element **34** carried by the support **20** moving along the rails **22** by the action of the rod **15** is brought into the position shown in Figure 2.

The action of the air sucked from the spaces **38** on the one hand and of the above described movement of the channel elements on the other hand results in the production of the corrugations represented in Figure 2. In this position the sheets are expediently placed in rigid moulds until the bonding agent in the asbestos-cement has hardened.

The frame **1** is advantageously suspended by means of hooks **57** and wires or cables to a device adapted to raise and lower the frame with respect to the table **56**.

What I claim is:

1. A process for manufacturing corrugated sheets from plane moldable fibro-cement sheets, including the steps of placing the plane sheet in a still moldable condition upon a plane supporting surface, applying suction to a plurality of parallel and spaced narrow areas of said sheet and then moving said narrow areas, while the suction force is maintained, parallel and relatively closer to each other so as to decrease the distance between said narrow areas of the sheet and thereby forming corrugations in the same.

2. A process for manufacturing corrugated sheets from plane moldable fibro-cement sheets, including the steps of placing the plane sheet in a still moldable condition upon a plane supporting surface, applying suction to the upper surface of a plurality of parallel and spaced narrow areas of said sheet and then moving said narrow areas, while the suction force is maintained, parallel and relatively closer to each other so as to decrease the distance between said narrow areas of the sheet and thereby forming corrugations in the same, and then lifting said corrugated sheet from said supporting surface and

transferring it to a mold provided with permanent corrugations.

3. A device for manufacturing corrugated fibro-cement sheets comprising a frame, a plurality of spaced parallel channel-shaped members providing suction chambers, means for mounting said channel-shaped members on said frame, means for producing a suction in said chambers whereby a plane fibro-cement sheet, when still moldable is adapted to adhere to said channel-shaped members along spaced narrow parallel zones, and a mechanism for adjusting said channel-shaped members on said frame parallel with respect to each other to reduce the distance between said parallel channel-shaped members, whereby said plane fibro-cement sheet adhering to said channel-shaped members due to the suction produced in the same is provided with corrugations.

4. A device for manufacturing corrugated fibro-cement sheets comprising a frame, a plurality of spaced parallel channel-shaped members providing suction chambers, said channel-shaped members having a channel-like cavity opening downwardly and including a flexible perforated cover sheet extending over said opening, said cover sheet being provided for engaging the fibro-cement sheet to be provided with corrugations, means for mounting said channel-shaped members on said frame, means for producing a suction in said chambers whereby a plane fibro-cement sheet, when still moldable, is adapted to adhere to said channel-shaped members along spaced narrow parallel zones, and a mechanism for adjusting said channel-shaped members on said frame parallel with respect to each other to reduce the distance between said parallel channel-shaped members, whereby said plane fibro-cement sheet adhering to said channel-shaped members due to the suction produced in the same is provided with corrugations.

5. A device for manufacturing corrugated fibro-cement sheets comprising a frame, a plurality of spaced parallel channel-shaped members providing suction chambers, means for mounting said channel-shaped members on said frame, means for producing a suction in said chambers whereby a plane fibro-cement sheet, when still moldable is adapted to adhere to said channel-shaped members along spaced narrow parallel zones, and a mechanism for adjusting said channel-shaped members on said frame parallel with respect to each other to reduce the distance between said parallel channel-shaped members, whereby said plane fibro-cement sheet adhering to said channel-shaped members due to the suction produced in the same is provided with corrugations, said mounting means including axially alined pairs of rods longitudinally and oppositely slidably mounted in said frame, means for slidably mounting some of said channel-shaped members on said rods and means for mounting other ones of said channel-shaped members fixedly on said rods, said mechanism being operatively connected with said pairs of rods and including means for moving said pairs of rods longitudinally and oppositely with respect to each other.

6. A device for manufacturing corrugated fibro-cement sheets comprising a frame, a plurality of spaced parallel channel-shaped members providing suction chambers, said channel-shaped members having a channel-like cavity opening downwardly and including a flexible perforated cover sheet extending over said opening, said cover sheet being provided for engaging the fibro-cement sheet to be provided with corrugations, means for

mounting said channel-shaped members on said frame, means for producing a suction in said chambers whereby a plane fibro-cement sheet, when still moldable, is adapted to adhere to said channel-shaped members along spaced narrow parallel zones, and a mechanism for adjusting said channel-shaped members on said frame parallel with respect to each other to reduce the distance between said parallel channel-shaped members, whereby said plane fibro-cement sheet adhering to said channel-shaped members due to the suction produced in the same is provided with corrugations, said mounting means including axially alined pairs of rods longitudinally and oppositely slidably mounted in said frame, means for slidably mounting some of said channel-shaped members on said rods and means for mounting other ones of said channel-shaped members fixedly on said rods, said mechanism being operatively connected with said pairs of rods and including means for moving said pairs of rods longitudinally and oppositely with respect to each other.

7. A device for manufacturing corrugated fibro-cement sheets comprising a frame, a plurality of spaced parallel channel-shaped members providing suction chambers, means for mounting said channel-shaped members on said frame, means for producing a suction in said chambers whereby a plane fibro-cement sheet, when still moldable is adapted to adhere to said channel-shaped members along spaced narrow parallel zones, and a

mechanism for adjusting said channel-shaped members on said frame parallel with respect to each other to reduce the distance between said parallel channel-shaped members, whereby said plane fibro-cement sheet adhering to said channel-shaped members due to the suction produced in the same is provided with corrugations, said mounting means including axially alined pairs of rods longitudinally and oppositely slidably mounted in said frame, means for slidably mounting some of said channel-shaped members on said rods and means for mounting other ones of said channel-shaped members fixedly on said rods, said mechanism being mounted on said frame and including an oscillatable drive shaft, a pressure fluid cylinder for operating said drive shaft, means operatively connecting said drive shaft with said pairs of rods, whereby said latter are moved longitudinally and oppositely with respect to each other when said drive shaft is oscillated.

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