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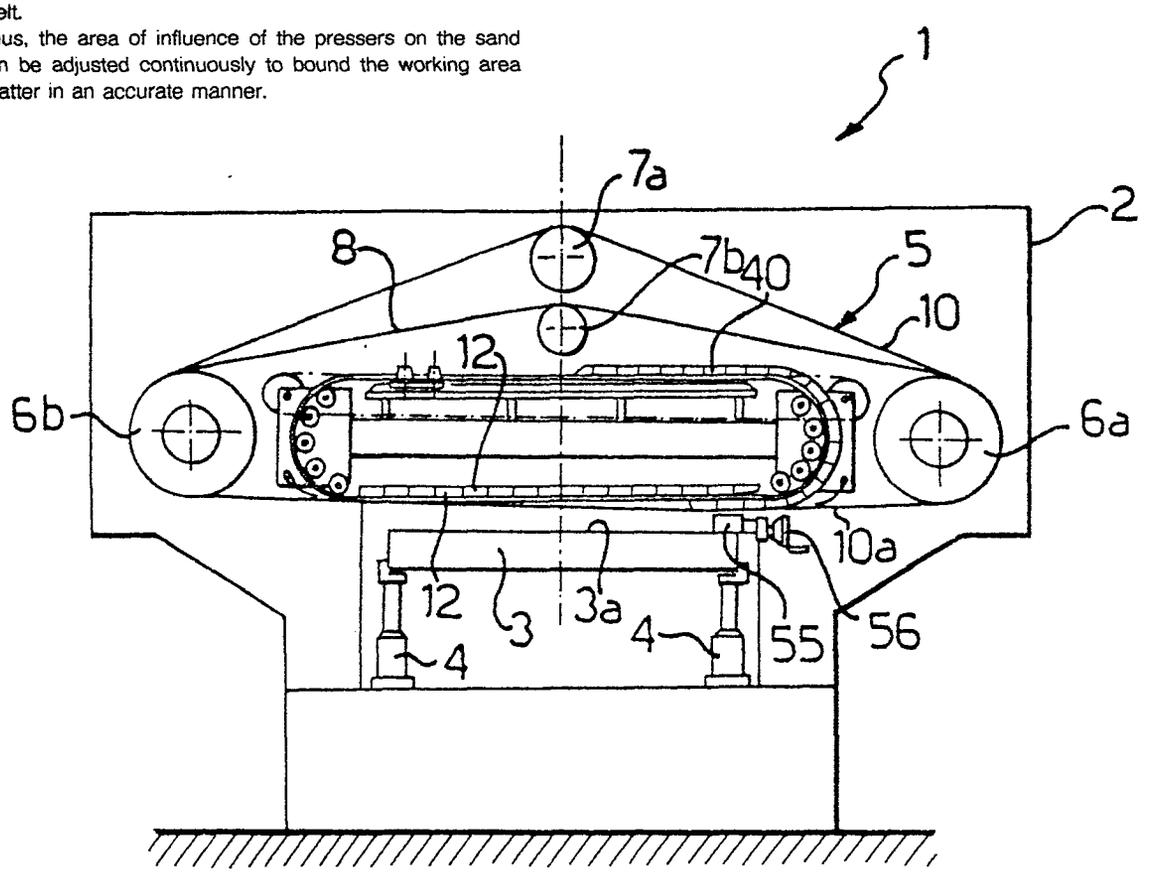
(54) A belt sander for open-work wood panels.

(57) In a belt sander, an elongate insert is shiftable adjustably within the area included between the sand belt and a plurality of pressers effective to apportion the working area of said sand belt.

Thus, the area of influence of the pressers on the sand belt can be adjusted continuously to bound the working area of the latter in an accurate manner.



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A BELT SANDER FOR OPEN-WORK WOOD PANELS

This invention relates to a belt sander for open-work wood panels, of a type which comprises, carried on a frame, an endless sand belt trained around a plurality of wheels at least one of which is a driving wheel, said belt having a working run which extends above and spaced apart from a conveyor table for a panel to be processed, and at least one pressure member acting on the working run of said sand belt to press it toward said conveyor table.

There exists a high demand for wooden structures of the type of open-work panels, consisting of a frame made up of uprights and cross-pieces interconnected at right angles to each other such that their grain directions have different orientations.

The problem encountered is that of sand finishing such uprights and cross-pieces in an assembled frame state.

As is well known in this specific field, best sanding is obtained by directing the cutting movement of the sand belt parallel to the wood fibers, and hence to its grain direction.

By converse, with the cutting motion of the sand belt directed obliquely to the wood fibers, thus cutting across the grain, a poor finish is to be achieved on the panel which will show scratches not to be easily disguised by subsequent processing.

It follows that for optimum sand finishing of an open-work wood panel, the cross-pieces must be sanded separately from the uprights using respective machines with sand belts arranged to only work on the former or the latter.

Currently available industrial sanders, even if equipped with plural sand belts having independently operated pressure members of the shoe type, are designed for sanding the entire flat surface of the panel either lengthwise or crosswise without taking into account the direction of lay of the grain of the various elements (cross-pieces and uprights) which make up the panel frame.

The breadth of the sand belt area at work on the panel is adjusted by varying the number of the pressure members acting on the sand belt.

However, this is a fairly coarse adjustment form, because it is to be carried in increments which are integer multiples of the size of a single shoe of the pressure members. This size, albeit relatively small, cannot be reduced below a set minimum dictated by the physical bulk of the shoes themselves and drive members which activate them.

Thus, being unable to provide for a continuous and accurate form of adjusting the breadth of the sand belt active or working area, separate sanding of the cross-pieces and uprights has yet to find application on an industrial scale, and it is, therefore, to be accepted that a good finish of the uprights, for example, should result in a less-than-good finish of the cross-pieces, and vice versa.

The problem underlying this invention is that of providing a sander which is designed, both construction- and function - wise, to obviate such prior shortcomings, that is, a sander wherein the breadth of the working area of the sand belt in engagement with a panel to be sanded can be adjusted to a very fine degree, and in the extreme, even continuously.

In its broadest terms, the solutive idea of the problem, is one of apportioning in an adjustable manner the pressure member area actively affecting the working run of the cited sand belt irrespective of the size of the pressure members.

The above solutive idea is embodied by a machine as indicated, characterised in that it comprises an insert of a set thickness extending in the same direction as said sand belt, over a set length, and being guided between said sand belt and said at least one pressure member, and a means of fitting said insert to an adjustable position between said sand belt and said at least one pressure member, to bring a section of the working run of said sand belt closer to said conveyor table and bound a working area thereof at that section of said belt where said insert is interposed between it and said at least one pressure member.

The invention features and advantages will become apparent from the following detailed description of a preferred embodiment thereof, taken in connection with the accompanying illustrative, but not limitative, drawings, where:

Figure 1 shows diagrammatically a sander according to the invention, in front elevation;

Figure 2 is an enlarged scale detail view of the machine of Figure 1;

Figure 3 is a perspective view of an open-work wooden panel; and

Figure 4 is an enlarged scale sectional view taken along the line IV-IV of Figure 2.

With reference to the drawing figures, a sander machine, generally indicated at 1, comprises a frame 2 of the portal type, a belt conveyor table 3 mounted on vertically adjustable jacks 4 and having a substantially horizontal work surface 3a which extends longitudinally through the frame 2, and a sand belt surfacing unit, generally indicated at 5 which is supported on the frame 2 above the conveyor table 3.

The unit 5 includes a train of four wheels, indicated at 6a,6b,7a and 7b, having parallel axes laid in the longitudinal direction of the conveyor table 3.

The wheels 6a,6b are mounted on the frame 2 on opposed sides of the conveyor 3, and one of them would be a power driving wheel.

The wheels 7a,7b are mounted at an intermediate, preferably middle, location between the wheels 6a,6b, and their distance from the work surface 3a of the conveyor is adjustable. In closed loop configuration around the wheels 6a,6b,7b is a belt 8, called the "running" belt, which forms a supporting and entraining member for a sand belt 10 overlying it and being, in turn, configurated as a closed loop around the wheels 6a,6b,7a; both belts, 8 and 10, extend crosswise to the conveyor table 3.

The sand belt 10 has a working run 10a facing the work surface 3a of the conveyor table 3, in spaced-apart and parallel relationship therewith.

A plurality of pressure members 12 are mounted stationary on the frame 2 to confront the belt 8 at the working run 10a of the sand belt 10.

Said pressure members 12, which are of substantially conventional type, are each provided with an actuator 13, such as an air-operated jack, and a shoe 14 driven by said actuator to press, on activation, the belt 8, and hence the belt 10, toward the work surface 3a of the conveyor table 3.

A subframe 15 is rigid with the frame 2 on the inside of the loop formed by the belt 10 and at the working run 10a thereof. The subframe 15 comprises a beam 16 extending in the direction of the sand belt 10 and provided, as its opposed ends, with respective heads, 17 and 18.

Each head, 17-18, carries a plurality of idler rollers 20 arranged with their axes parallel to one another and to form respective curved guides 21 and 22 with facing concave sides.

Trained around the guides 21, 22 is a flexible endless belt element 23 having a first run 24 which extends between the shoes 14 and belt 8, and a second run 25, juxtaposed to the first and fastened to a slide 27 by means of clamps 26.

The slide 27 is mounted slidably along a straight runway 28 which is attached, as by studs 29, to the beam 16 in parallel relationship therewith.

An endless chain 30 trained around two idler sprockets 31 and 32, respectively, mounted rotatably on the respective heads 17 and 18, has a cut-off run with its ends attached to the slide 27 by means of adjusters 34.

The sprocket 31 is rotatively rigid with a hand-wheel, not shown, accessible from outside the frame 1.

Secured on the flexible element 23 is an insert 40 of a set thickness which extends over a shorter length than the linear extension of said element 23 and slightly longer length than said runs 24,25 thereof.

In the example shown, the insert 40 is formed of a plurality of pads 41 in a row, which are fastened to the flexible element 23, on the outward side of the loop formed thereby.

Between the pads 41 and running belt 8, there stretched preferably an anti-friction belt 42, such as a graphitized cloth belt, with its opposed ends attached to the heads 17 and 18.

The insert 40 is introduced in between the shoes 14 and anti-friction belt 42 in the opposite direction to the direction of movement of the sand belt 10 (arrow A in Figure 2).

In this direction, the foremost shoe in the row at the working run 10a of the belt 10, has a working surface 45 facing said belt and sloping to diverge from the running belt 8 in the direction of the arrow A.

That sloping working surface, additionally to forming a lead-in for introducing the insert into the space between the shoes 14 and antifriction belt 42, defines the start of a sanding area, indicated at B in Figure 2, in which the belt 10 engages operatively with a portion of a panel 50, as explained in detail hereinafter.

The panel 50 comprises, in the example shown in Figure 3, a peripheral frame formed of a pair of uprights 51a and 51b, and a corresponding pair of cross-pieces 52a and 52b. The uprights and cross-pieces are mutually connected at right angles and surround a center portion 53 of the panel 50.

The operation of the machine 1 is the following: the panel 50 is placed on the worksurface 3a of the conveyor table 3 and fed toward the surfacing unit 5 along a perpendicular direction to the plane of the sheet in Figures 1 and 2. On the conveyor table, the panel 50 is registered against a straight detent 55 laid along one side of the conveyor table 3 and shiftable over the surface 3a thereof transversely to the feeding movement of the panel 50 by means of screw adjustment members 56.

Thus, the panel 50 is brought to a position below the surfacing unit 5 which is preset and adjustable relatively to the latter.

Upstream of the machine 1, the panel 50 has been subject to a surfacing treatment either over its entire surface or limited to the uprights 51a, 51b or the cross-pieces 52a, 52b alone.

To only sand, for example, the cross-pieces 52a, 52b, the detent 55 would be positioned such that the trailing end of the working area B in the direction of the arrow A is brought to coincide with the line of joint between said cross-pieces and the upright 51a.

To merely sand the cross-pieces 52a, 52b, the working area B should be adjusted to have the same dimension as the cross-pieces.

To this aim, through its respective handwheel, the sprocket 31 is turned, thereby the chain 30 is pulled to provide a like displacement of the slide 27 on the runway 28. Along with the slide 27, the flexible belt element 23 is also shifted by an equal amount whose runs 24 and 25 would be respectively released and taken up (or vice versa) according to the direction of movement of said slide 27.

If, for example, the slide 27 is moved in the direction of the arrow A in Figure 2, a progressive introduction of the insert 40 into the space between the shoes 14 and belt 8 is obtained, thereby the breadth of the sanding area B is increased. Thus, the element 23 functions also a means of introducing the insert 40 to an adjustable position between the sand belt 10 and pressure members 12. The sanding area will be bounded by a start position B_1 which is fixed relatively to the frame 2 and defined by the working surface 45 of the leading shoe 14, and an end position B_2 which is variable and corresponds substantially to the position of the end of the insert 40 between the shoes 14 and anti-friction belt 42.

The net effect is one of apportioning the area of the pressure member affecting the area B_2 of the end sanding in an adjustable manner.

In sanding the cross-piece 52b, for example, the plurality of pressure members 12 would be lowered as a whole toward the conveyor table 3, but only some of them, specifically those overlying the insert 40, would become active on the belt 10 to confine its sanding area B.

On moving the shoes 14 of all the pressure members 12 away from the conveyor table 3, the sand belt 10 is disengaged from the cross-piece 52b, and the panel 50 is quickly fed forward on said conveyor table to position the cross-piece 52a below the working run 10a of the belt 10, thereafter the aforesaid operations are performed in like sequence.

Thus, the sander of this invention solves the problem set forth and achieves a number of advantages, among which great constructional simplicity, just as high reliability in operation, and a degree of accuracy within the sanding area B on the order of one millimeter.

Claims

1. A belt sander comprising, supported on a frame (2), a sand belt (10) trained in closed loop configuration around a plurality of wheels (6a,6b,7a) at least one of which is a driving wheel, said belt (10) having a working run(10a) extending above and spaced apart from a conveyor table(3) for a panel to be processed, at least one pressure member (12) acting on the working run (10a) of said sand belt(10) to press it toward said conveyor table(3), characterised in that it comprises an insert (40) of a set thickness extending in the same direction as said sand belt(10) over a set length and being guided between said sand belt and said at least one pressure member(12), and a means(23,27,30) of fitting said insert (40) to an adjustable position between said sand belt (10) and said at least one pressure member(12) to bring a section of the working run (10a) of said sand belt (10) closer to said conveyor table and bound a working

area(B) thereof at that section of said belt (10) where said insert (40) is interposed between it and said at least one pressure member(12).

2. A belt sander according to Claim 1, characterised in that said insert (40) is flexible; and said means comprises a flexible belt element(23) whereto said insert (40) is attached, said flexible belt element (23) extending in the same direction as said belt (10) and between said belt (10) and said at least one pressure member (12).

3. A belt sander according to Claim 2, characterised in that it comprises a subframe (15) rigid with said frame (2) within the loop formed by said belt(10) and extending in the same direction as said belt(10) above said at least one pressure member(12), a curved guide (20,21) at each end of said subframe (15), and a slide(27) supported slidably on said subframe (15) and movable adjustably thereon, said flexible belt element (23) being mounted in a closed loop configuration around said subframe(15) and said curved guides (20, 21) with a first run (24) thereof extending between said sand belt(10) and said at least one pressure member(12) and with a second run(25) thereof attached to said slide(27), said insert (40) including a plurality of pads(41) affixed to the outward side of the loop formed by said flexible belt element (23) and arranged in a row.

4. A belt sander according to Claim 1, characterised in that said insert (40) has a longitudinal dimension substantially equal to the distance spanned by said pressure members (12) in the longitudinal direction of said sand belt(10).

5. A belt sander according to Claim 3, characterised in that said insert (40) has a shorter longitudinal dimension than the longitudinal dimension of said flexible belt element (23)

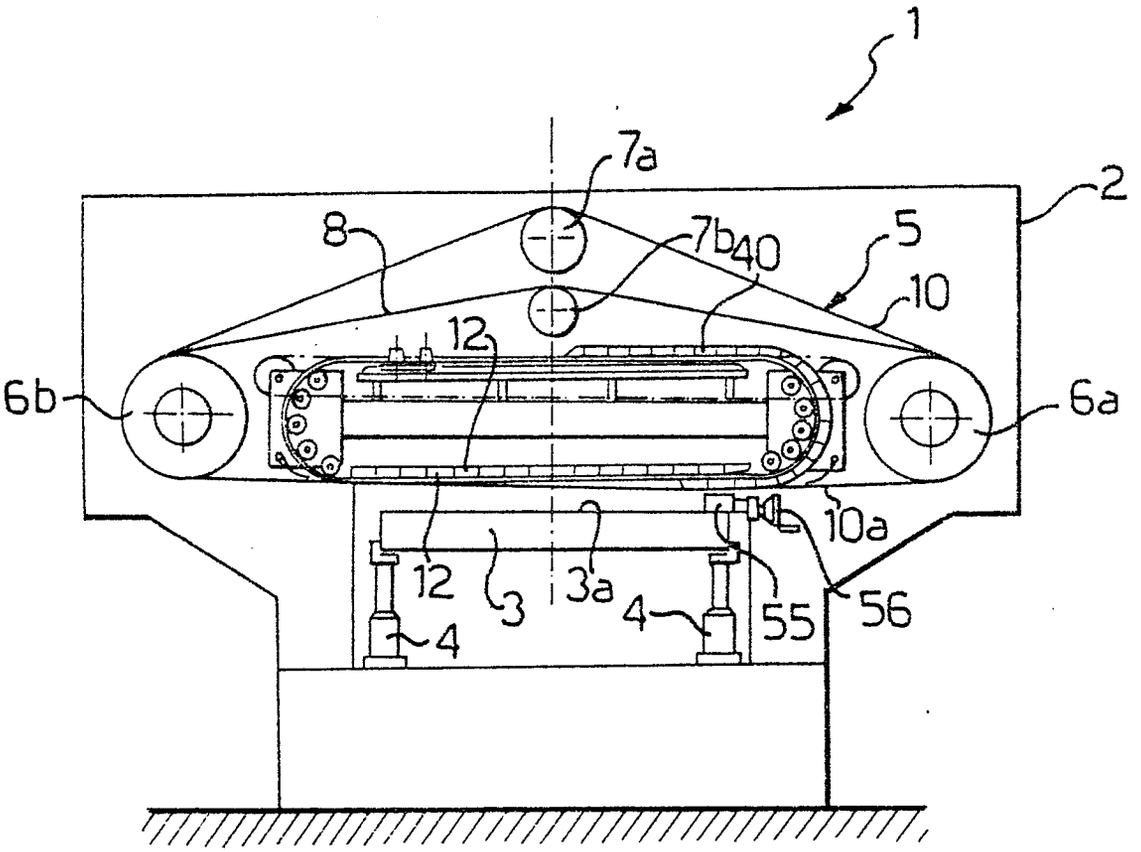


Fig-1

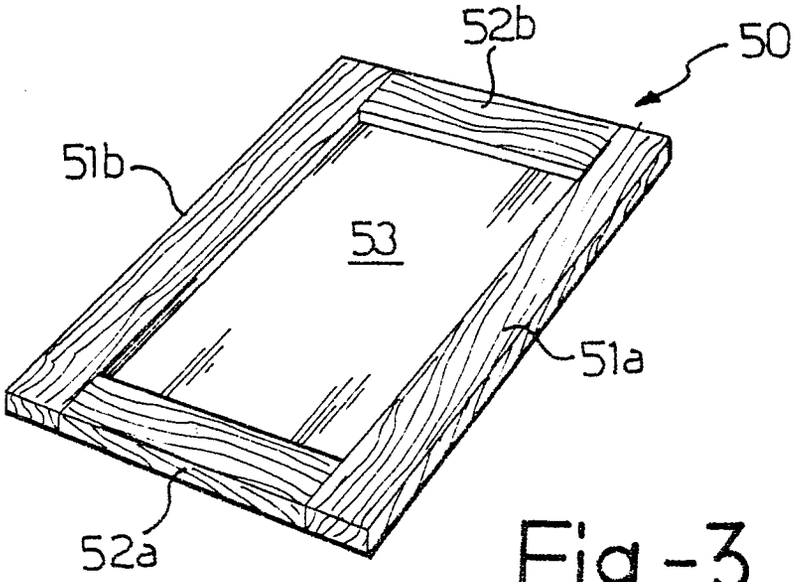
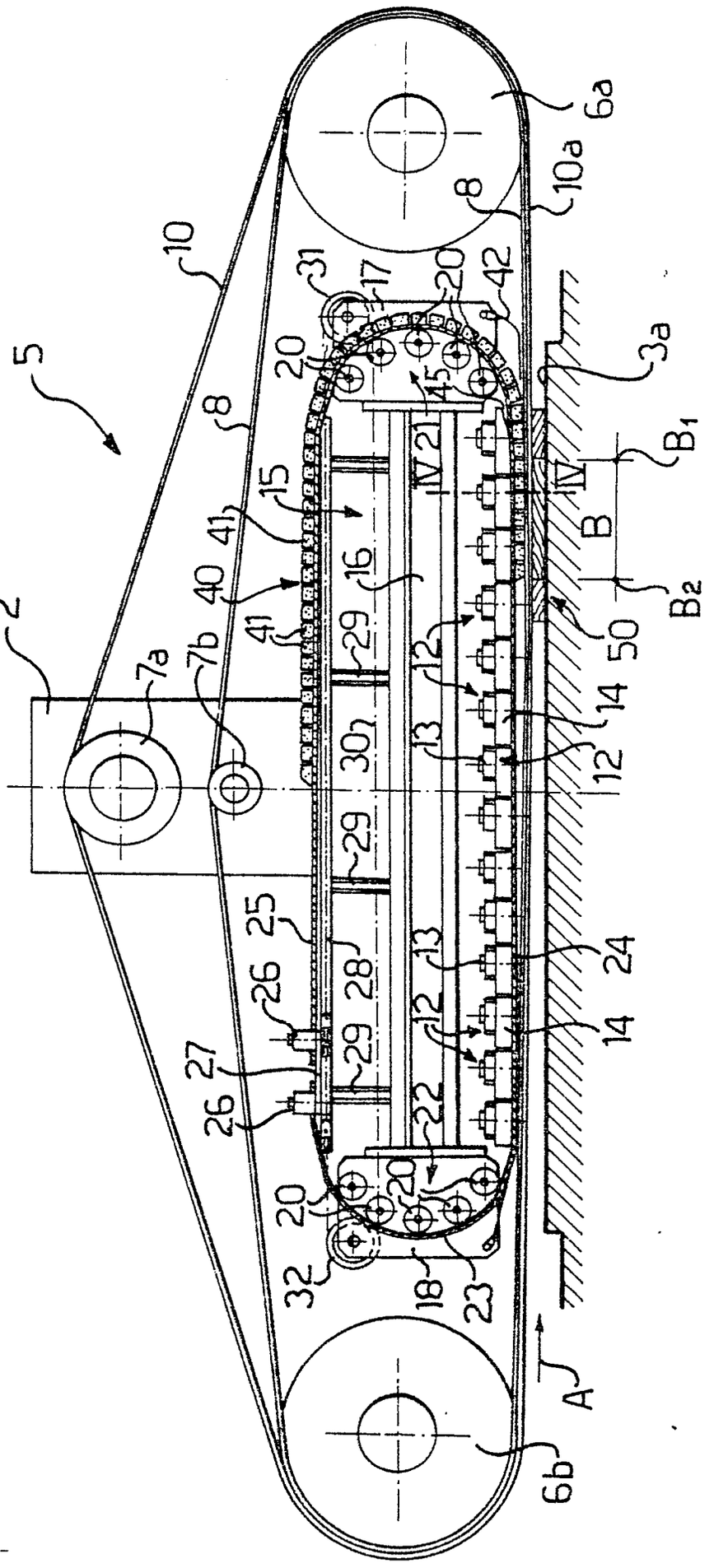


Fig-3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2
7a
7b
10
6a
10a
8
31
17
20
42
3a
45
21
IV
B1
B
B2
15
41
40
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26
27
22
18
23
32
A
6b

Fig-2

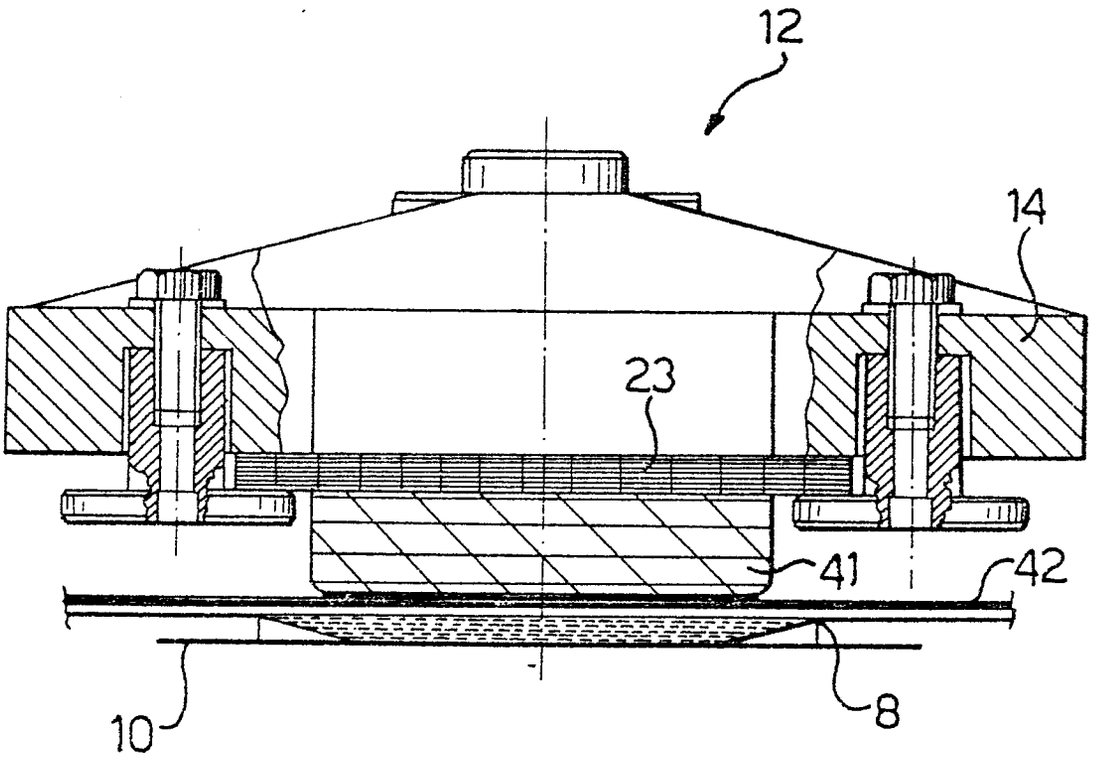

Fig- 4