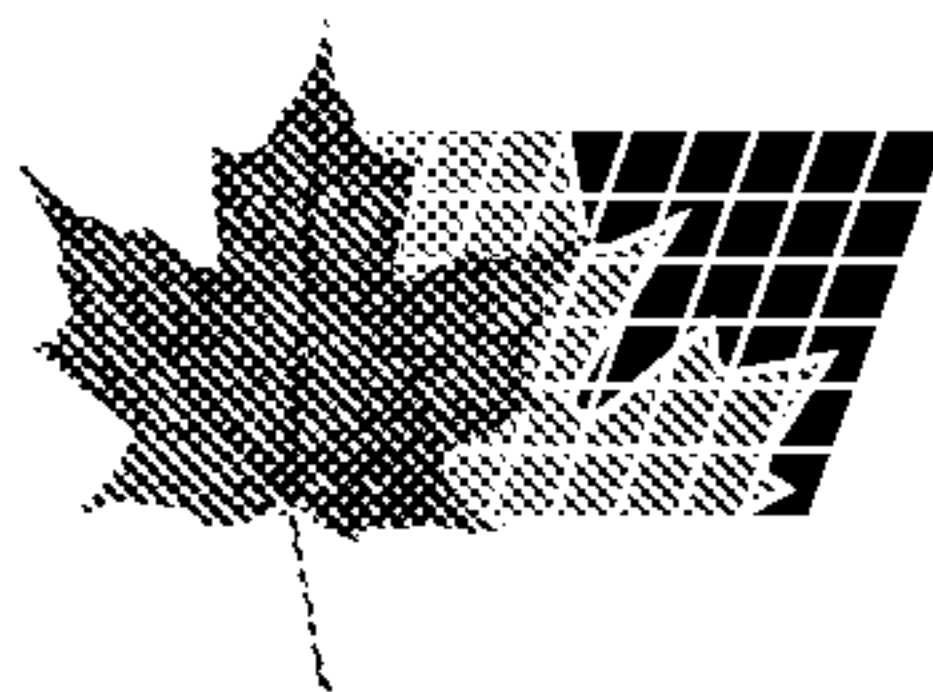




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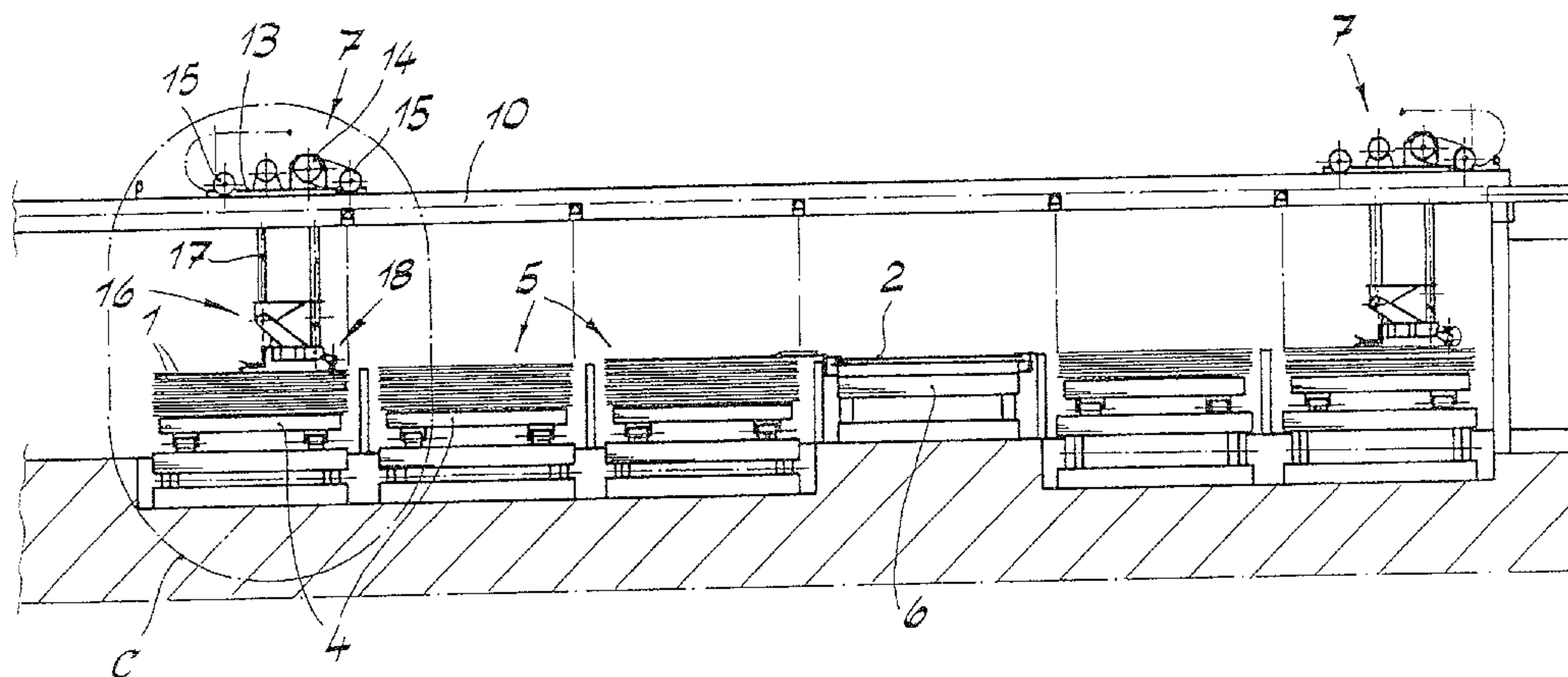
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(54) **APPAREIL D'EMPLAGE DE FEUILLES POUR STRATIFIES**

(54) **APPARATUS FOR THE ASSEMBLY OF SHEETS INTO STACKS
OF PRESS MATERIALS**



(57) Apparatus used in the manufacture of laminated sheets, especially decorative laminated sheets using a platen press, especially a single layer platen press, for the assembly of sheets to stacks of press materials and for the removal of the press material stacks, includes a plurality of rising and falling stack-receiving tables positioned in a row, an assembly table for the supporting of at least one stack of press materials, and a pick-up and lay-down arrangement. This arrangement is constructed as a unitary pick-up and lay-down trolley which includes a suction beam and a clamping tool. The trolley is movable along fixed rails which are positioned above the row of stack-receiving tables and the assembly table. A transfer table for the press material stacks is positioned between the assembly table and the platen press, which transfer table cooperates with a loading arrangement for the platen press. The pick-up and lay-down trolley is operable in accordance with the cycle times of the platen press so that the apparatus can be operated at a relatively higher output.



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ABSTRACT

Apparatus used in the manufacture of laminated sheets, especially decorative laminated sheets using a platen press, especially a single layer platen press, for the assembly of sheets to stacks of press materials and for the removal of the press material stacks, includes a plurality of rising and falling stack-receiving tables positioned in a row, an assembly table for the supporting of at least one stack of press materials, and a pick-up and lay-down arrangement. This arrangement is constructed as a unitary pick-up and lay-down trolley which includes a suction beam and a clamping tool. The trolley is movable along fixed rails which are positioned above the row of stack-receiving tables and the assembly table. A transfer table for the press material stacks is positioned between the assembly table and the platen press, which transfer table cooperates with a loading arrangement for the platen press. The pick-up and lay-down trolley is operable in accordance with the cycle times of the platen press so that the apparatus can be operated at a relatively higher output.

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APPARATUS FOR THE ASSEMBLY OF SHEETS
INTO STACKS OF PRESS MATERIALS

The invention relates to apparatus used in the manufacture of laminated sheets for the assembly of sheets into stacks of press materials and for the transport thereof.

Laminated sheets, especially decorative laminates, are generally compressed in a platen press, especially a single layer platen press, and assembled in an apparatus having a plurality of rising and falling sheet stack receiving tables arranged in a row, an assembly table for the assembly of stacks of press materials from a plurality of sheets, and a pick-up and lay-down mechanism for the picking-up of sheets from the sheet stacks and for their assembly to stacks of press materials. The pick-up and lay-down mechanism includes at least one suction beam and at least one clamping tool and may include a turning-over tool for the sheets for the positioning of sheets upside down in the stacks of press materials. The term "press materials" includes, for example, paper sheets, resin impregnated paper sheets, plastic foils, metal foils, substrate mats, and the like, which are used as separating, reinforcing, or decorative layers and the like. Each stack of press materials includes a plurality of sheets which are compressed in the platen press to a laminated sheet used, for example, in the production of printed circuits.

In a conventional installation known from German Patent DE 27 25 831, the pick-up and lay-down mechanism includes a stationary rising and falling stack-receiving table and stationary, but rising and falling, suction beams positioned at the ends of the table. Each stack receiving table is provided with a trolley which is movable along fixed rails and includes a clamping tool for the clamping of a sheet lifted by the associated, stationary suction beams. The tool can be constructed so that the sheet can be turned over. To that end, the suction beam is rotated from the position "suction strip down" to the position "suction strip directed towards the trolley". The suction beam is surrounded by a manipulation bar which is spaced apart from and parallel to the axis of rotation of the suction beam, and rotatable together with the suction beam around the axis of the suction beam. To turn over a sheet, an edge

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of the sheet which was picked up by the suction beam is first lifted in a rolling movement from the sheet stack by movement of the suction beam in one direction. Subsequently, the manipulation bar is moved thereunder and the sheet is positioned onto the manipulating bar upon further rotation of the manipulating bar and reverse movement of the suction beam. In conventional installations, several pick-up and lay-down mechanisms are positioned side by side and operated in parallel. This is functional and provides good availability, but, the construction and control technology costs are high and the installation is not sufficiently flexible for use in automated manufacture. The overall cycle time of a conventional installation is governed by the time required for the individual functions which must be carried out until one or several stacks of press materials can be removed from the apparatus and loaded into the platen press. Furthermore, where high flexibility is required, the pick-up and lay-down operations are to this day performed manually by operating personnel. The lower limit for the cycle times is then determined by the working speed of the operating personnel. The cycle time so limited is substantially longer than physically and chemically possible in the manufacture of laminated sheets, especially decorative laminated sheets, when a platen press is used.

It is now an object of the invention to provide an apparatus of the above described general type which is of simple construction and function and can be operated at the cycle time of an associated platen press, which mainly depends on the physical and chemical processes taking place in the manufacture of the laminated sheets and, of course, includes the times for loading and unloading of the platen press.

This object is achieved in an apparatus in accordance with the invention, wherein

- A. the pick-up and lay-down mechanism is constructed as a unitary pick-up and lay-down trolley which includes the suction beam and the clamping tool;
- B. the pick-up and lay-down trolley is movable on fixed rails which are positioned above the row of stack-receiving tables;
- C. a transfer table for the stacks of press materials is positioned between the assembly table and the platen press and cooperates with a loading arrangement for the platen press; and

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the pick-up and lay-down trolley is operable in correspondence with the cycle time of the plate press.

In a preferred embodiment, the pick-up and lay-down trolley has an undercarriage having a drive and a running gear and a working mechanism which includes the suction beam and the clamping tool. The working mechanism is preferably movable along a pair of spaced apart parallel fixed rails and is mounted to the undercarriage by supporting elements which are connected to the undercarriage between the rails. It is preferred to center the tracks over the row of stack-receiving tables and the assembly table. Furthermore, the suction beam and the clamping tool preferably extend horizontally beyond the vertical plane extending through the respective rails.

In contrast to conventional installations wherein the pick-up and lay-down mechanism consists of two independent tools and is of complicated construction and function, the pick-up and lay-down tools of an apparatus in accordance with the invention are combined in a unitary pick-up and lay-down trolley which provides for a substantially simplified construction and function and significantly improves the flexibility of the apparatus.

In a preferred embodiment, the stack-receiving tables are positioned to both sides of the assembly table, a part of pick-up and lay-down trolleys are provided, and the assembly table as well as the stack-receiving tables to both sides thereof are accessible by both trolleys. Preferably at least one of the trolleys further includes a turn-over tool for the picked-up sheets.

A construction in accordance with the invention combined with modern drive and control technology, especially when computerized, provides for the achievement of cycle times which only depend on the type of platen press used and the physics and chemistry of the processes taking place during the pressing operation. Therefore, an apparatus in accordance with the invention can be operated at a relatively higher output.

A preferred embodiment of the invention will now be further described by way of example only and with reference to the attached drawings wherein

Figure 1 is a top plan view of a preferred embodiment of an apparatus in accordance with the invention;

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Figure 2 illustrates an enlarged view of section A shown in Figure 1;

Figure 3 is an elevational view of the embodiment of Figure 1 as seen in direction of arrow B and drawn at the same scale as the embodiment shown in Figure 2; and

Figure 4 is an enlarged view of section C of the embodiment shown in Figure 3.

The apparatus illustrated in the figures is used for the assembly of sheets 1 into one or more stacks of press materials 2 and for the removal of the press material stacks 2 in the manufacture of laminated sheets and decorative laminated sheets using a platen press 3, preferably a simple layer platen press. The principle construction of an apparatus in accordance with the invention includes a plurality of rising and falling stack-receiving tables 4 which are positioned in a row and each support a sheet stack 5, an assembly table 6 for the assembly of press material stacks 2 from a plurality of the sheets 1, and a pick-up and lay-down mechanism 7 for the sheets. The pick-up and lay-down mechanism 7 includes at least one suction beam 8 and at least one clamping tool 9. It will become apparent from a comparison of Figure 1 with Figures 2 and 3 that the pick-up and lay-down mechanism 7 is constructed as a unitary pick-up and lay-down trolley which supports the suction beam 8 and the clamping tool 9. The unitary pick-up and lay-down trolley 7 is movable along a pair of spaced apart parallel fixed rails 10 which are positioned above and extend along the row of stack-receiving tables 6. As shown in Figures 1 and 2, a rising and falling transfer table 11 for the press material stacks 2 is positioned between the assembly table 6 and the platen press 3, which transfer table cooperates with a clamping bar loading arrangement 12 for the platen press 3, for example. Suitable transfer table and clamping bar loading arrangement 12 will be readily apparent to a person skilled in the art. The pick-up and lay-down trolley 7 is operated in correspondence with the cycle time of the plate press 3. This cycle time is product specific and depends on the physical and chemical requirements for the manufacture of the laminated sheets from the stacks of press materials 2. Of course, the time required for loading and unloading of the press is included in the cycle time.

Turning now to Figure 4, the pick-up and lay-down trolley 7 has an undercarriage 13 which includes a drive 14, a running gear 15 and a

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working mechanism 16. The working mechanism 16 includes the suction beam 8 and the clamping tool 9. As will be apparent from Figures 2 and 3, the undercarriage 13 runs on the pair of spaced apart parallel fixed rails 10. The working mechanism 16 is mounted to the undercarriage 13 by supporting elements 17 which are connected to the undercarriage in the region between the rails 10. The rails 10 are centered over the stack receiving tables 4 and the assembly table 6. Both the suction beam 8 and the clamping tool 9 of the working mechanism 16 extend laterally beyond the vertical plane of the respective rails 10 (see Figure 2). In this embodiment, the stack-receiving tables 4 are positioned to both sides of the assembly table 6. A pair of pick-up and lay-down trolleys 7 are used and the assembly table 6 as well as the stack receiving tables 4 to both sides thereof can be accessed by both trolleys. The suction beams 8 and the clamping tools 9 cooperate in the manner known in the art and the clamping tools are provided with auxiliary tools which permit insertion of the respective clamping jaw under a sheet 1 lifted by the associated suction beam. At least one of the pick-up and lay-down trolleys 7 is provided with a turn-over mechanism 18 for the sheets 1, which is schematically indicated in Figure 4 by an arc.

An operator may be stationed at the position designated by arrow B in Figure 1 for manual assistance. For example, the operator may lift the respective sheets 1 to create a gap which allows the insertion of supporting elements under the individual sheets which, in turn, can be done automatically. The supporting elements may be wire bows.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. An apparatus used in the manufacture of laminated sheets in a platen press for the assembly of a stack of press materials and for the removal thereof, comprising

a plurality of rising and falling stack-receiving tables for respectively supporting a stack of at least one sheet, and being positioned in a row;

an assembly table for supporting a stack of press materials including a plurality of sheets,

a suction beam for lifting a sheet located on top of a stack of sheets supported on one of the stack-receiving tables and a clamping tool for picking-up and laying down a lifted sheet, the suction beam and the clamping tool being part of a unitary pick-up and lay-down trolley for picking-up a sheet from a stack-receiving table and laying-down the picked-up sheet onto the assembly table, the pick-up and lay-down trolley running along fixed rails positioned above the row of stack-receiving tables, and

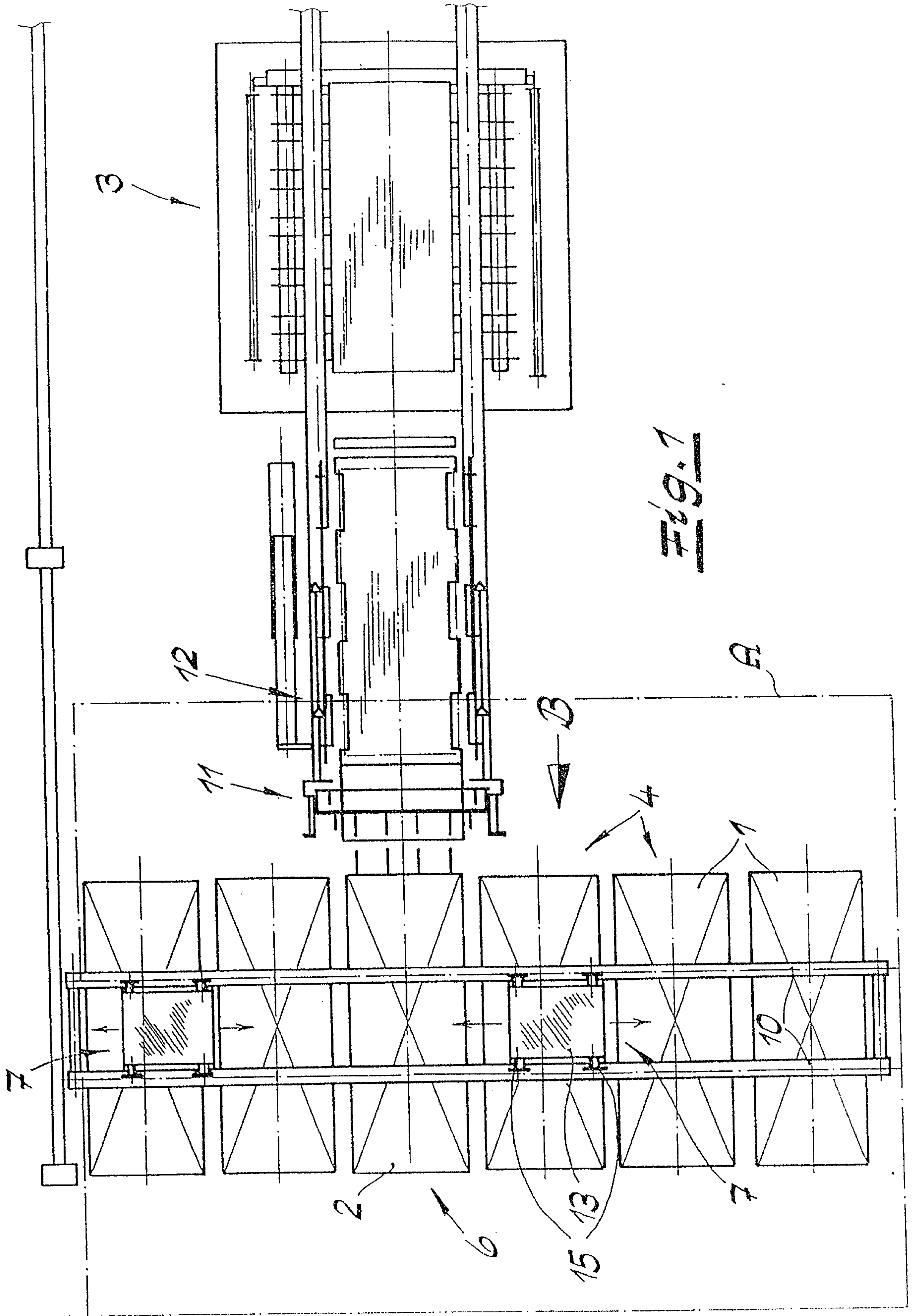
a transfer table for transferring a fully assembled stack of press materials from the assembly table to the platen press, the transfer table being cooperably linked with a loading arrangement for the platen press,

whereby the pick-up and lay-down trolley is operated in correspondence with a cycle time of the platen press.

2. An apparatus according to claim 1, wherein the pick-up and lay-down trolley includes an undercarriage having a drive and a running gear, and a working mechanism including the suction beam and the clamping tool, the trolley runs on a pair of spaced apart parallel fixed rails, and the working mechanism is mounted to the undercarriage by a pair of supporting elements which are connected to the undercarriage in the region between the tracks.

3. An apparatus according to claim 1 or 2, wherein the tracks are centered over the stack receiving tables and the assembly table, and the suction beam and the clamping tool of the working mechanism extend horizontally beyond a vertical plane of the respective tracks.

4. An apparatus according to claim 1 or 2, wherein the stack-receiving tables are positioned to both sides of the assembly table.
5. An installation according to claim 3, wherein the stack-receiving tables are positioned to both sides of the assembly table.
6. An apparatus according to claim 1, 2 or 5, including a pair of pick-up and lay-down trolleys for respectively accessing the assembly table and the stack receiving tables to both sides thereof.
7. An apparatus according to claim 3, including a pair of pick-up and lay-down trolleys for respectively accessing the assembly table and the stack receiving tables to both sides thereof.
8. An apparatus according to claim 4, including a pair of pick-up and lay-down trolleys for respectively accessing the assembly table and the stack receiving tables to both sides thereof.
9. An apparatus according to claim 6, wherein at least one of the trolleys further includes a means for turning over a sheet.
10. An apparatus according to claim 7 or 8, wherein at least one of the trolleys further includes a means for turning over a sheet.



Jacob & Saylor

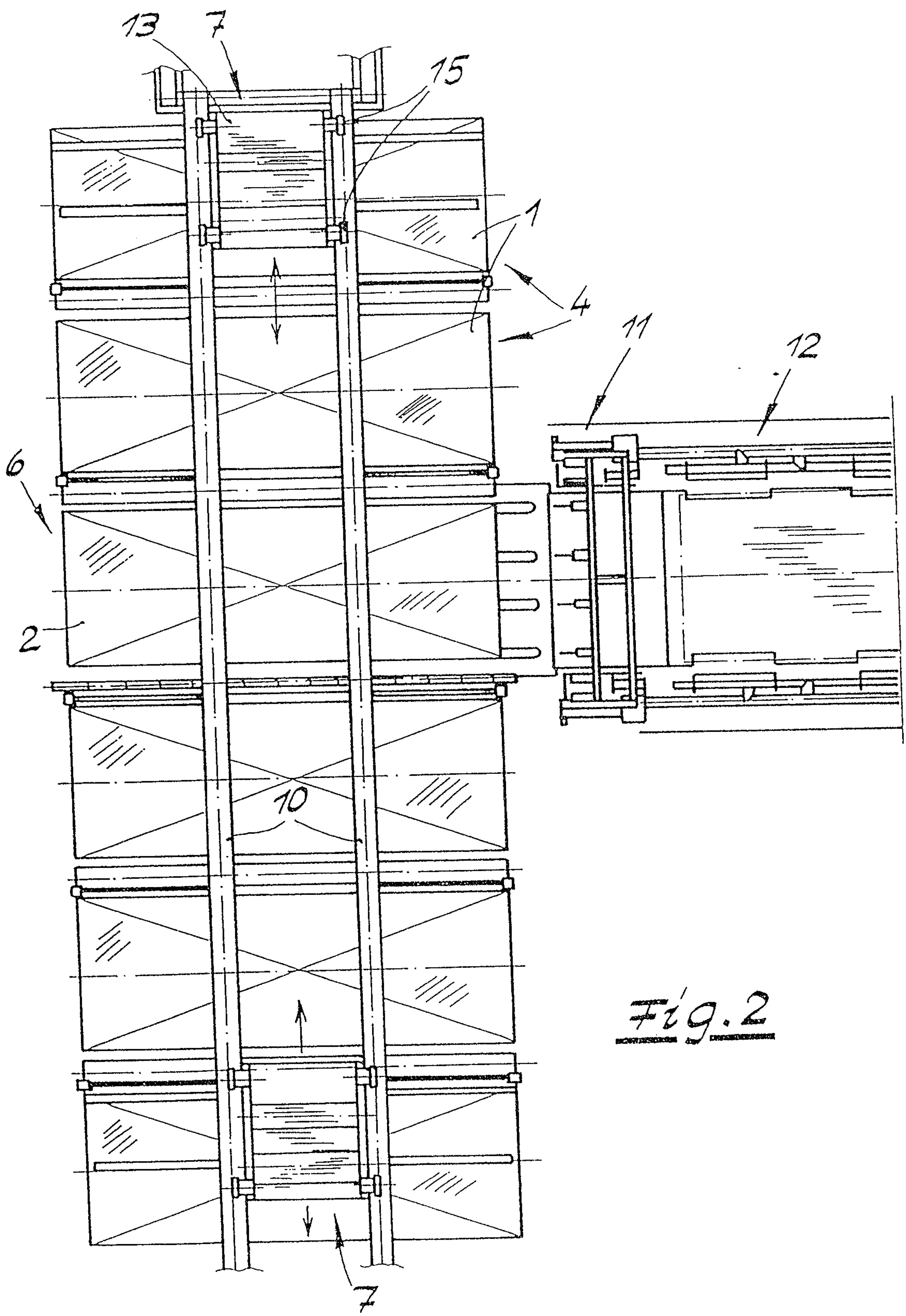
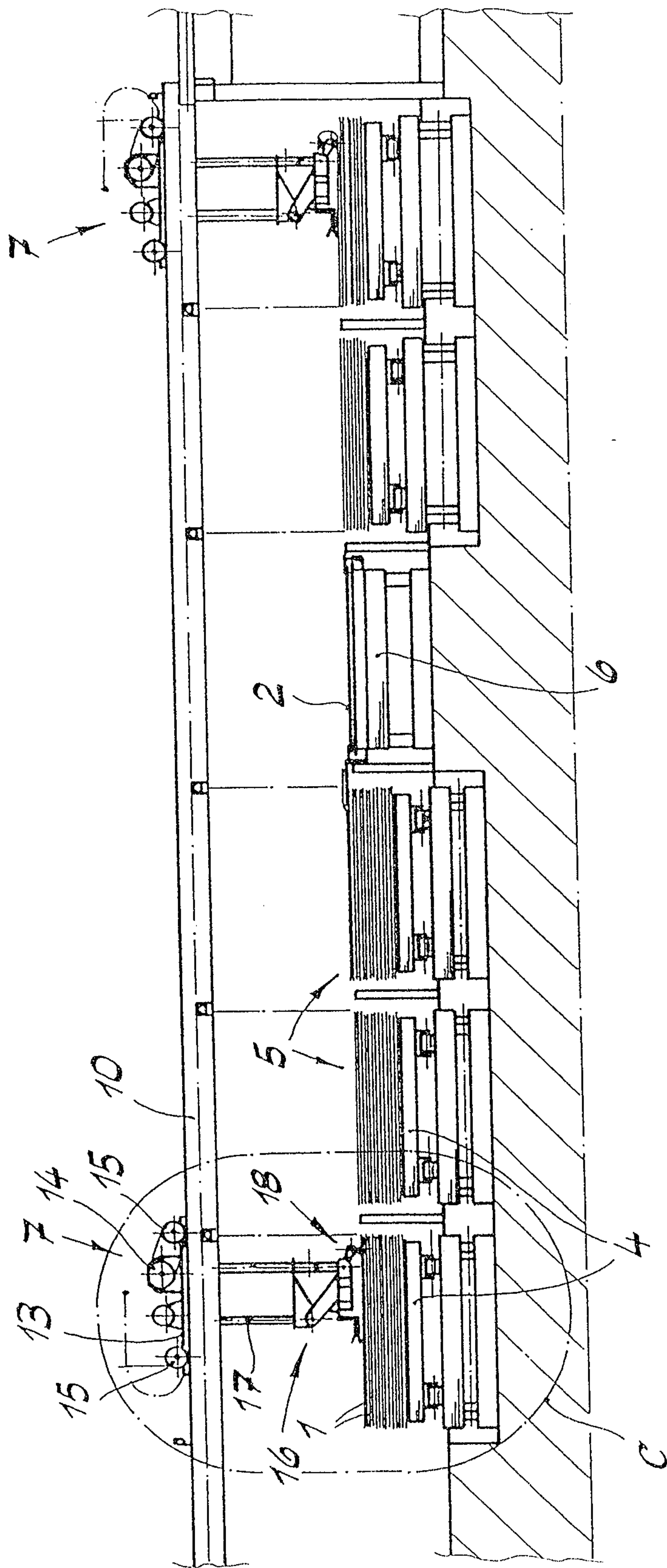


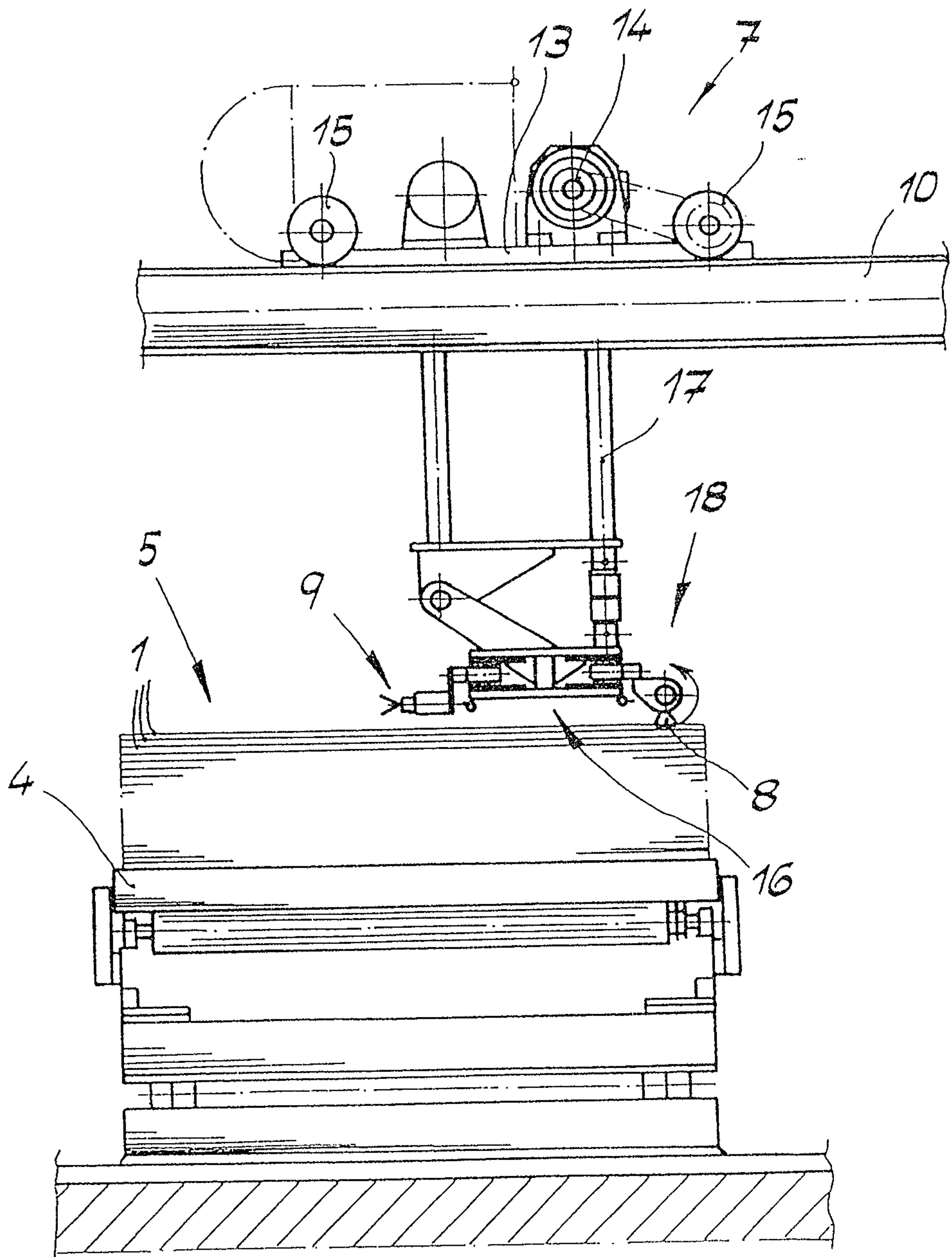
Fig. 2

Scott & Lyon

Fig. 3



Scott & Lyon

Fig. 4*Scott & Sykes*