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CA 2558863 C 2008/12/02

(11)(21) 2 558 863

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

(22) Date de dépôt/Filing Date: 2006/09/06

(41) Mise à la disp. pub./Open to Public Insp.: 2007/03/07

(45) Date de délivrance/Issue Date: 2008/12/02

(30) Priorité/Priority: 2005/09/07 (DE10 2005 042 439.2)

(51) Cl.Int./Int.Cl. *B65H 20/12* (2006.01), *B65H 20/02* (2006.01), *B65H 37/06* (2006.01), *B65H 43/00* (2006.01), *B65H 45/00* (2006.01)

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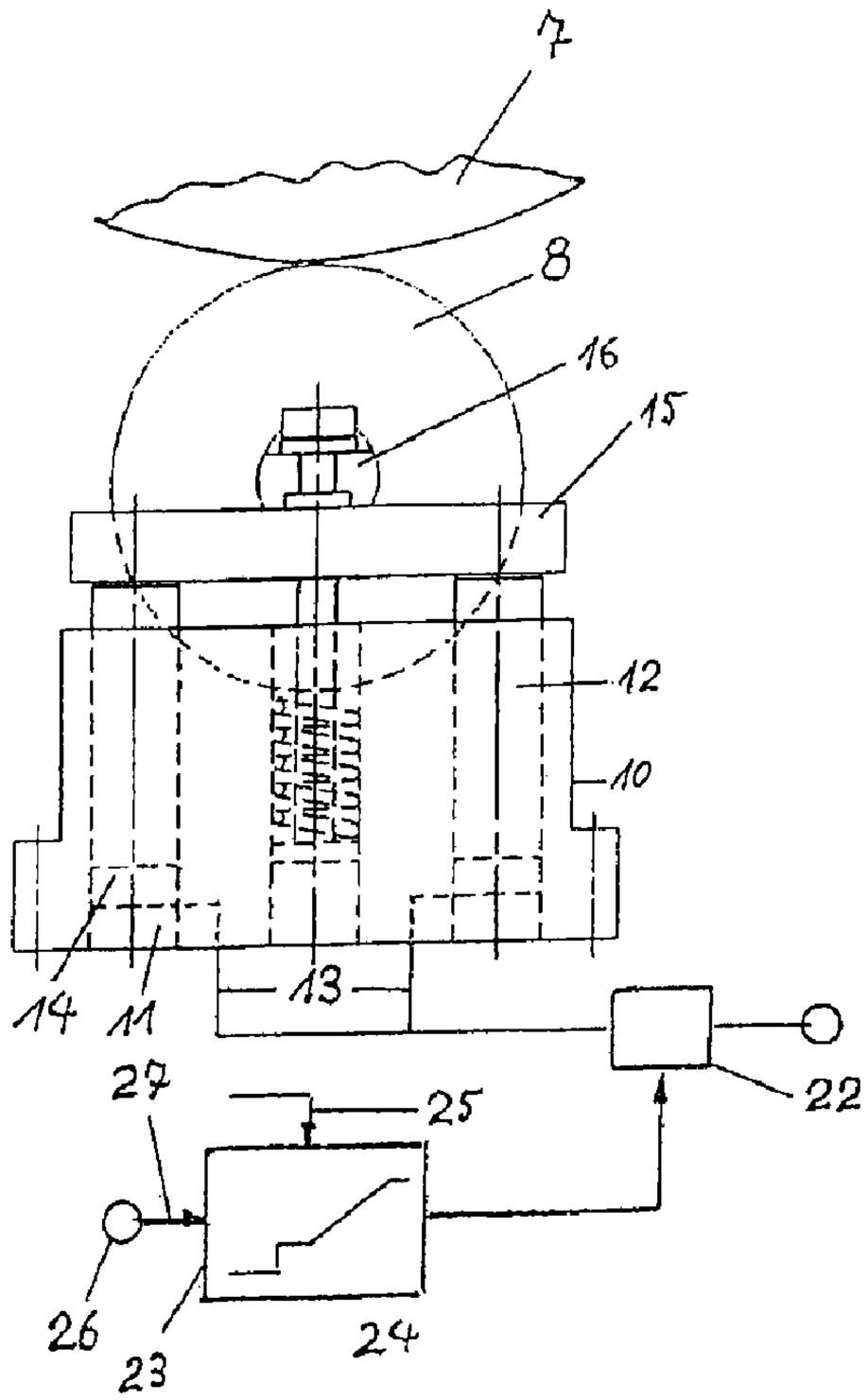
(54) Titre : DISPOSITIF ET METHODE DE TRANSPORT DE MATIERE EN BANDE CONTINUE
(54) Title: APPARATUS AND METHOD FOR THE TRANSPORT OF WEB-LIKE MATERIAL



(57) Abrégé/Abstract:
An apparatus and method for the transport of web-like material, in particular printed webs or packets of printed webs fed from a fold former positioned downstream of a printing machine with a roll that can be driven and against which pressure-application rolls

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(57) Abrégé(suite)/Abstract(continued):
can be adjustably pressed is disclosed. A high degree of working and operational security can be achieved by arranging that the pressure-application rolls are carried by a relevant assigned position-setting assembly which exhibits at least one actuating element capable of receiving an impulse from a pressure-applying agent, where the impulse from the pressure-applying agent can be controlled according to a pre-settable timing sequence by a control device.

ABSTRACT OF THE DISCLOSURE

An apparatus and method for the transport of web-like material, in particular printed webs or packets of printed webs fed from a fold former positioned downstream of a printing machine with a roll that can be driven and against which pressure-application rolls can be adjustably pressed is disclosed. A high degree of working and operational security can be achieved by arranging that the pressure-application rolls are carried by a relevant assigned position-setting assembly which exhibits at least one actuating element capable of receiving an impulse from a pressure-applying agent, where the impulse from the pressure-applying agent can be controlled according to a pre-settable timing sequence by a control device.

APPARATUS AND METHOD FOR THE TRANSPORT OF WEB-LIKE MATERIAL

BACKGROUND

The invention relates to an apparatus and method for the transport of web-like material, in particular printed webs or packets of printed webs fed from a fold former positioned downstream of a printing machine with a roll that can be driven and against which pressure-application rolls can be adjustably pressed.

The pressure-application rolls, together with the driven draw-rolls, form an in-draw gap. It is necessary, therefore, to take measures to effectively prevent the risk of fingers being crushed. In the known arrangements a protective hood is provided for the pressure-application rollers. This certainly offers adequate protection against the risk of fingers being crushed. It is a disadvantage, however, that the protective hood prevents a clear view being obtained of the in-draw gap and of the transported web material. A quite special disadvantage is that the space between a protective hood and a pressure-application roll can become smaller which leads to the pressure-application roller being blocked. Experience has shown that when webs of paper are being processed so-called spaghetti-formation often develops as a consequence of the faulty adjustment of slitting knives, etc., in that the spaghetti collects between one or more protective hoods and the associated pressure-application rolls and blocks them after a period of time. This results in the affected pressure-application rolls grinding on the driven draw-rolls which leads to the flattening and, consequently, to the destruction of the pressure-application rolls.

SUMMARY

It is therefore the object of the present invention to improve an arrangement of the type described above with simple and economic means such that the use of a protective hood can be dispensed with while nevertheless providing adequate protection against the risk of fingers being crushed.

This objective is achieved according to the invention in that the pressure-application rolls are carried by a relevant assigned position-setting assembly which exhibits at least one actuating element capable of receiving an impulse from a pressure-applying agent, where the impulse from the pressure-applying agent can be controlled according to a pre-settable timing sequence by a control device.

These measures offer the possibility in an advantageous manner that the position-setting procedure does not have to operate suddenly as before but rather that it can proceed comparatively slowly and/or in several stages. This ensures that that an operator, who when adjusting the setting of the pressure-application rolls - an activity which in many cases requires direct vision of the relevant pressure-application roll - must insert his/her fingers into the danger area to detect the adjustment movement of the pressure-application roll, has sufficient time to withdraw his/her fingers before the position-setting procedure is completed or the full application of pressure takes effect. It is possible, therefore, advantageously to dispense with all other protective measures. Also advantageously, there is consequently no longer any danger that a pressure-application roll can be blocked in the event of spaghetti build-up and destroyed as a result. In addition to providing a high level of working safety, the measures according to the invention accordingly guarantee a high level of process security and freedom from the risk of breakdown which has a beneficial effect upon the overall economic situation.

Thus, the control device can expediently exhibit a control valve which is designed as a proportioning valve and arranged in a supply line which provides a pressure-applying agent and is assigned to the position-setting assembly. With the assistance of a proportioning valve it is possible to achieve in an advantageous manner not only any desired timing sequence but also any desired final level of applied pressure - and to do so in a simple way.

A further extension of the present invention is that the control valve can be controlled by a memory-endowed computer in which the desired timing sequence together with, preferably, the desired level of applied pressure is stored. This ensures an automatic implementation of the position-setting procedure. A further advantage is that in the event of a change in the desired timing sequence, etc., only the relevant software needs to be amended. It is therefore possible to adapt to the circumstances of the individual situation in a simple manner.

In a further extension of the present invention, the position-setting assembly can exhibit a housing block with two projectable pistons where each one seals off a working space which can receive an impulse from a pressure-applying agent and where the ends protruding out of the housing block are connected by a yoke upon which is securely mounted at least one appropriate axle carrying at least one pressure-application roll. The twin pistons provided here with the yoke carrying the axle provide a high degree of stability and consequently very smooth running of the pressure-application roller. In addition, the integration of the cylinder-piston frame in a housing block results in a very compact arrangement.

A further expedient advantage can be that at least one return positioning spring in the housing block is assigned to the yoke. Consequently, the pistons can be designed as simple operating pistons which permits a simple form of construction.

Further advantageous developments and expedient extensions of the overriding measures of the present invention are provided in greater detail in the example description below and by reference to the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings:

Figure 1 shows a partial view of the upper part of a folding section with a fold former and an associated in-draw arrangement;

Figure 2 shows a pressure-application roll with an associated position-setting assembly in the fully engaged position;

Figure 3 shows the arrangement according to Figure 2 in the disengaged position;

Figure 4 shows an applied pressure/time diagram; and

Figure 5 shows a view of a pressure-application roller arranged so as to be laterally displaceable.

DETAILED DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates a fold former 2 arranged in the upper part 1 of a folding section to which a web packet consisting of several webs imposed upon one another is directed and which come from an upstream printing machine not shown in any greater detail here. For this purpose, the individual webs leaving the printing machine run over a so-called harp consisting of several in-feed rolls 3, the deflection rolls 4 and the in-draw devices 5 arranged successively. Each of the in-draw devices 5 consists of a draw-roll 7 extending the full width of the machine and powered by an assigned drive motor 6 where adjustable pressure-application rolls (trolleys) 8 can be pushed against the draw-roll. The pressure-application rolls 8 are

mounted on freely rotating bearings and rotate solely under the influence of friction.

The pressure-application rolls 8 can be positioned against or away from the relevant assigned draw-roll 7. All the pressure-application rolls 8 or selected pressure-application rolls may be involved. To serve this purpose, the pressure-application rolls 8 are mounted in a position-setting assembly 9 which permits the pressure-application roll 8 to move at right angles to its axis. As can be seen from Figures 2 and 3 each position-setting assembly 9 contains a housing block 10 with an integrated cylinder-piston arrangement to effect the desired adjustment of the assigned pressure-application roll 8. To that end, the housing block 10 is provided with two bored holes which run in the engaged and disengaged position-setting direction. These holes are closed at the rear by a fitting 11 and each of them is penetrated internally by a length of shaft functioning as a piston 12 which together with the fitting 11 demarcates a working space 14 which can be dynamically filled through a supply line 13 by a pressure medium, preferably compressed air. The ends of the pistons 12 remote from the working space 14 protrude out of the housing block 10 and they are connected to one another by a yoke 15 forming a portal-like configuration which guarantees high stability. A protruding axle 16 is secured to the yoke 15 on which the relevant assigned pressure-application roll 8 is mounted in a manner permitting free rotation. The axle 16 is flattened where it sits on the yoke 15 to provide plane contact surfaces.

The pistons 12 are designed as simple working pistons which when pressure is applied to the relevant assigned working space 14 are pushed away from the basic driven-in position illustrated in Figure 3 to the basic driven-out position illustrated in Figure 2. The reverse motion is effected by a return positioning spring 17. To facilitate this the housing block 10 is provided with a central bored hole 18 into which a pin 19 attached to the yoke 15 penetrates. The yoke side of the bored hole 18 is closed by a fitting 20 which is pierced by the pin 19. The side of the pin 19

that is remote from the yoke is provided with a spring plate 21. The return spring 17 is supported on one side by the fitting 20 and on the other side by the spring plate 21. In the course of the position-setting procedure, i.e., when driving out the pistons 12, the return positioning spring 17 is compressed. As soon as the pressure in the working spaces 14 drops, the return positioning spring 17 pushes back the yoke 15 and the pressure-application roll 8 carried upon it from the basic engaged position shown in Figure 2 to the basic disengaged position shown in Figure 3 in which the pistons 12 are driven up to the stop on the rear-mounted fittings 11 in the housing block 10.

In order to prevent any risk of fingers being crushed, the position-setting movement of the pressure-application rolls 8 does not take place suddenly, but rather, slowly and or in several stages with increasing speed. To that end, as depicted in Figure 2, a control valve 22 is arranged in the common supply line 13 from a source of pressure which is not illustrated in any more detail to the two working spaces 14 in the housing block 10. Expediently, this valve is designed as a proportioning valve and by its use the generation of pressure in the working spaces 14 can be controlled such that a desired timing sequence is obtained for the generation of pressure in the working spaces and, consequently, of the setting and application of pressure upon the pressure-application rolls 8. A control device 23 is provided to activate the control valve 22, which control device expediently contains a computer into the memory of which the desired timing sequence can be stored.

As mentioned above, the generation of pressure in the working spaces 14 and, correspondingly, the execution of the position-setting procedure can proceed slowly or in several stages. A multistage position-setting and pressure-application procedure is illustrated in Figure 4. The function 24 depicted schematically in Figure 4 schematically shows the course of the level of applied pressure with time.

In a first stage here, the pressure-application roll 8 is placed against the assigned draw-roll 7 with no or negligible force. In a second stage there is a progressive increase in the level of applied pressure up to a desired norm value which develops in a linear or slow manner. It is expedient if in the first stage the level of applied pressure is only slightly higher than the return force exerted by the return positioning spring 17. The selected norm value for the second stage, i.e., the final application pressure, can also be stored in the memory of the computer. In the case of different product situations, e.g., wide format or tabloid format, different norm values can be stored so that the norm value can also vary.

The first stage can be started by a switching procedure where the pressure rises comparatively quickly to the abovementioned strength of the return positioning spring 17, which is indicated by the stage "s". Continued switching from the first to the second stage can result from a time-function element in the control device 23 which is initiated at the beginning of the first stage and continues the switching procedure at the end of the second stage. It is also conceivable to arrange for the further switching procedure from the first to the second stage to be dependent upon the operating circumstances of the printing machine, for example, the instant of the first instruction to run, i.e., the commencement of printing. To achieve this, the control device 23 can be connected to the control system of the printing machine as is indicated by an input 25. To facilitate a manual start the control device is provided with an input 27 connected to a switch 26. The first stage can also be started by this means. It is also conceivable to start the first stage automatically in dependence upon the operating circumstances of the printing machine, for example at the completion of the feed-through operation.

Once the second stage has commenced, the pressure rises comparatively slowly along the ramp "r" to the abovementioned norm value. In the illustrated example the ramp r is linear. A non-linear or stepped rise is, however, also conceivable.

The pressure-application rolls 8 are positioned only in the pressure-free areas of the relevant web in motion. Correspondingly, the pressure-application rolls 8 can be arranged to be adjustable over the width of the machine. To that end and as can be seen from Figures 1 and 5, each position-setting assembly 9 which carries a pressure-application roll 8 is provided with a carriage 28 which accepts the appropriate housing block 10 and which is displaceably mounted on a traverse 29 extending across the width of the machine. The position of the carriages 28 can be changed either manually or by powered means, for example by a motor-driven threaded shaft, and then locked in the desired position. This is effected by a clamping device which is shown in Figure 5 only by its activation lever 30.

In the illustrated example the clamping device for locking the relevant assigned carriage 28 is operated manually by the activation lever 30. In the case of motorized adjustment of the position of the carriage 28 it is also possible to provide mechanically operated locking by, for example, an electromagnetic device.

List of reference symbols:

1	Upper part of a folding section
2	Fold former
3	In-feed rolls
4	Deflection rolls
5	In-draw devices
6	Drive motor
7	Draw-roll
8	Pressure-application rolls
9	Position-setting assembly
10	Housing block
11	Fitting
12	Piston
13	Supply line
14	Working space

15 Yoke

16 Axle

17 Return positioning spring

18 Bored hole

19 Pin

20 Fitting

21 Spring plate

22 Control valve

23 Control device

24 Ramp function

25 Input

26 Switch

27 Input

28 Carriage

29 Traverse

30 Activation lever

The foregoing disclosure has been set forth merely to illustrate the invention and is not intended to be limiting. Since modifications of the disclosed embodiments incorporating the spirit and substance of the invention may occur to persons skilled in the art, the invention should be construed to include everything within the scope of the appended claims and equivalents thereof.

What is claimed is:

1. An apparatus for the transport of web-like material, in particular printed webs or packets of printed webs fed from a fold former positioned downstream of a printing machine with a draw roll and against which a pressure-application roll can be adjustably pressed, wherein the pressure-application roll is carried by an assigned position-setting assembly which includes at least one actuating element which receives an impulse from a pressure-applying agent, wherein the impulse from the pressure-applying agent is controllable according to a pre-settable timing sequence by a control device.

2. The apparatus according to Claim 1, wherein a control valve controlled by the control device is arranged in a device which provides the pressure-applying agent and is assigned to the actuating element.

3. The apparatus according to Claim 2, wherein the control valve is a proportioning valve.

4. The apparatus according to any one of Claims 1 to 3, wherein the control device contains a computer with a memory in which the timing sequence is stored.

5. The apparatus according to any one of Claims 1 to 4, wherein the impulse from the pressure-applying agent to the actuating element is effected in two stages, wherein in a first stage the pressure-application roll is pressed against the draw roll without a force and wherein in a second stage the force is increased rapidly to a prescribed norm value.

6. The apparatus according to Claim 5, wherein the norm value is stored in the control device.

7. The apparatus according to any one of Claims 1 to 6, wherein a final positioning force of the pressure-application roll is variable in dependence upon a current production of the apparatus.

8. The apparatus according to any one of Claims 5 to 7, wherein switching to the second stage takes place in dependence upon an operating circumstance of the printing machine.

9. The apparatus according to any one of Claims 1 to 8, wherein the control device is connected to a control system of the printing machine.

10. The apparatus according to any one of Claims 5 to 7, wherein the control device contains a time function element which effects a switching to the second stage.

11. The apparatus according to any one of Claims 1 to 10, wherein the position-setting assembly contains a housing block that defines a bore hole, wherein a piston is disposed within the bore hole, and wherein the bore hole includes a working space.

12. The apparatus according to Claim 1, wherein the actuating element includes two parallel pistons arranged in a housing block of the position-setting assembly, wherein each piston seals off a working space which receives the impulse from the pressure-applying agent, and wherein an end of each piston protruding out of the housing block is connected by a yoke upon which is mounted at least one axle carrying the pressure-application roll.

13. The apparatus according to Claim 12, wherein at least one return positioning spring in the housing block is assigned to the actuating element.

14. The apparatus according to Claim 13, wherein the return positioning spring engages with the yoke wherein an end of the spring remote from the yoke lies against a spring plate connected to the yoke by a penetrating spindle

and wherein an end of the spring adjacent to the yoke lies against a stop in a side of the housing block.

15. The apparatus according to any one of Claims 1 to 14, wherein the position-setting assembly is provided with a carriage which is mounted in a displaceable manner upon a traverse and is lockable in position by a clamping device.

16. An apparatus for the transport of a web-like material fed from a fold former positioned downstream of a printing machine, comprising:

a draw roll;

a position-setting assembly including a pressure-application roll, wherein the position-setting assembly moves the pressure-application roll to a first position where the pressure-application roll engages the draw roll and a second position where the pressure-application roll is disengaged from the draw roll; and

a control device, wherein the control device is coupled to the position-setting assembly and provides a pre-settable timing signal to the position-setting assembly to control the movement of the pressure-application roll.

17. The apparatus according to Claim 16, wherein the pre-settable timing signal controls the movement of the pressure-application roll such that when the position-setting assembly moves the pressure-application roll to the first position where the pressure-application roll engages the draw roll, the position-setting assembly moves the pressure-application roll to a first engagement pressure and a second engagement pressure, wherein the second engagement pressure is greater than the first engagement pressure.

18. The apparatus according to Claim 17, wherein the first engagement pressure increases linearly over a period of time to the second engagement pressure.

19. A method for the transport of a web-like material fed from a fold former positioned downstream of a printing machine, comprising the steps of:

moving a pressure-application roll by a position-setting assembly to a first position where the pressure-application roll engages a draw roll and a second position where the pressure-application roll is disengaged from the draw roll; and

controlling the movement of the pressure-application roll by a pre-settable timing signal sent to the position-setting assembly by a control device.

20. The method according to Claim 19, wherein the step of moving the pressure-application roll to the first position includes the step of moving the pressure-application roll from a first engagement pressure to a second engagement pressure, wherein the second engagement pressure is greater than the first engagement pressure.

FIG. 1

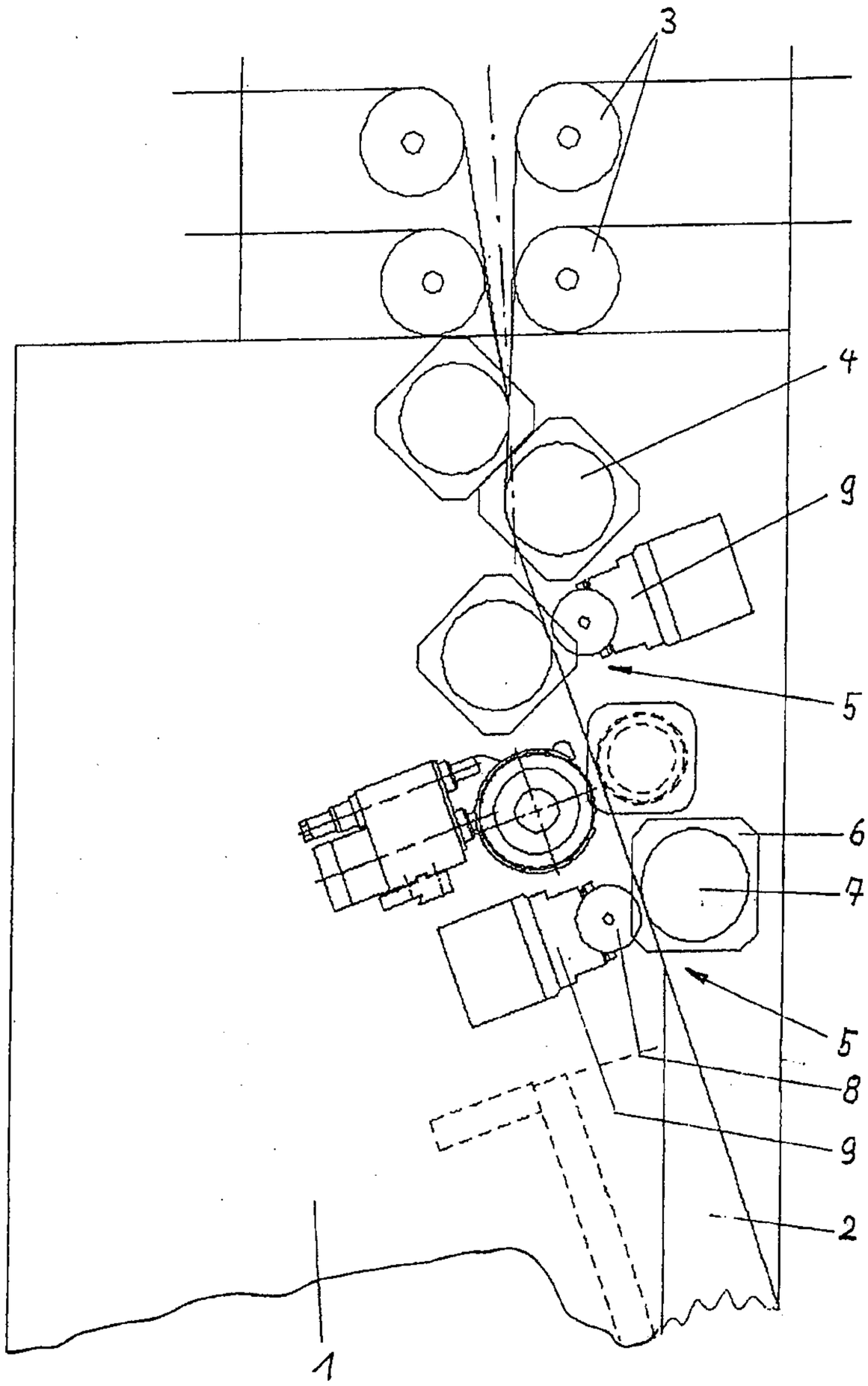


FIG. 2

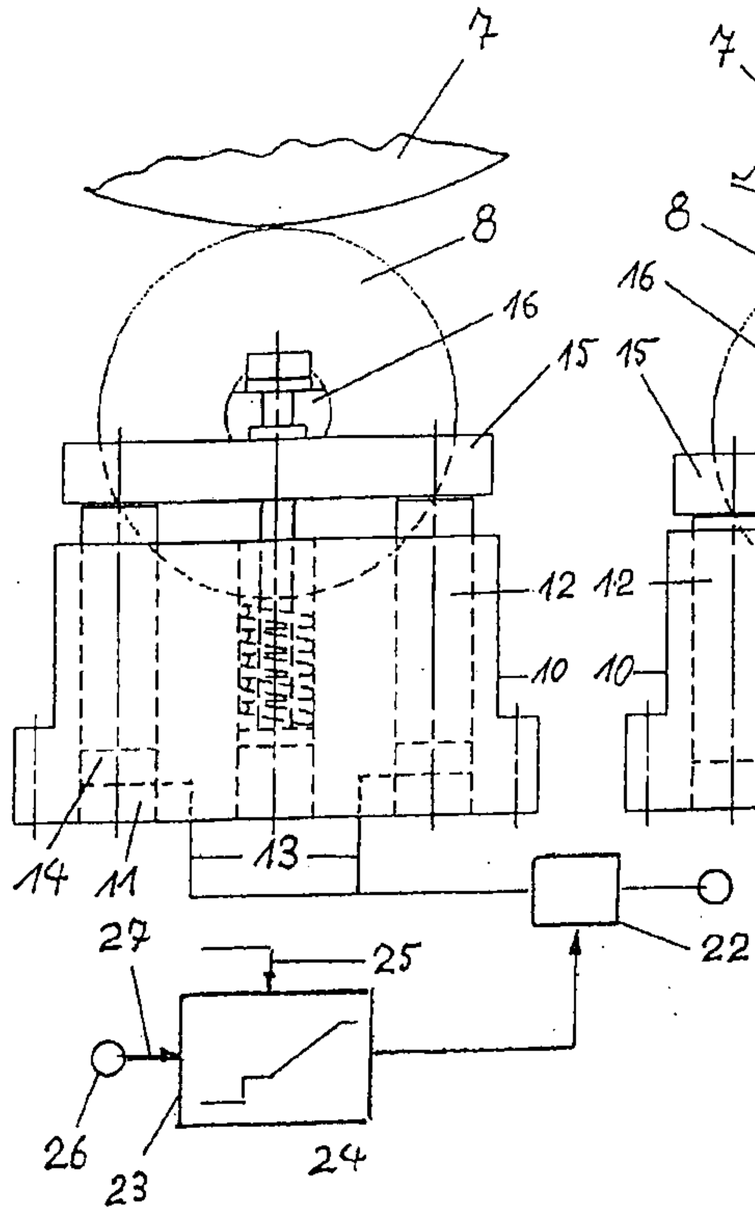


FIG. 3

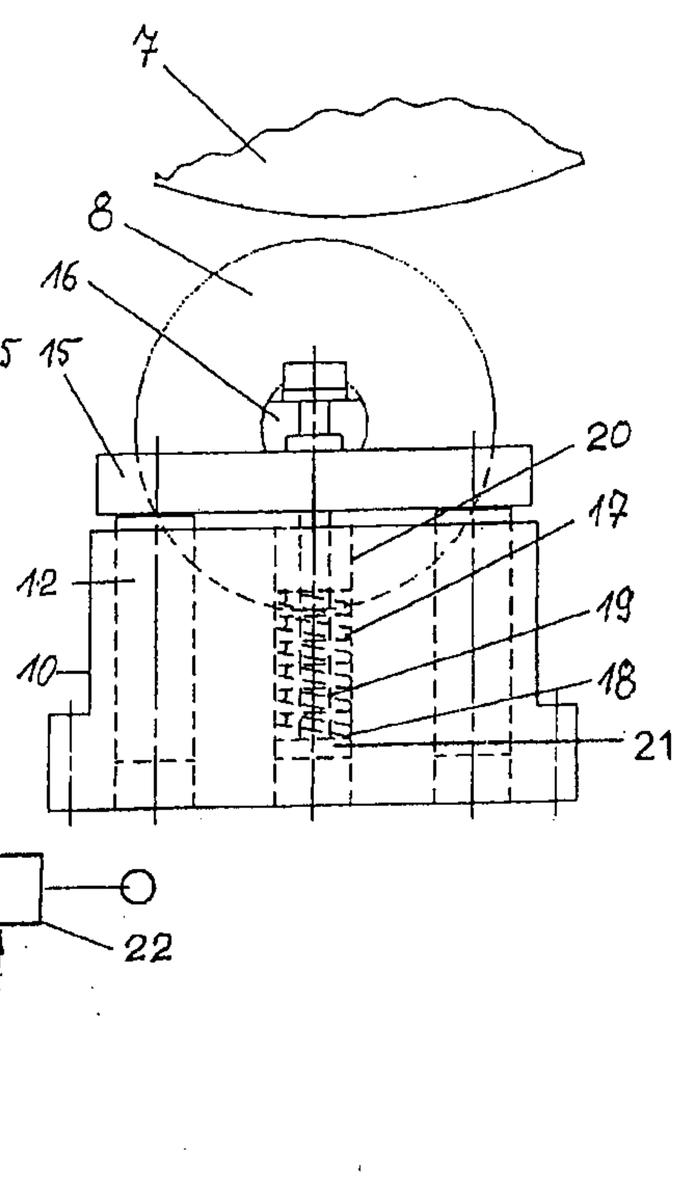


FIG. 4

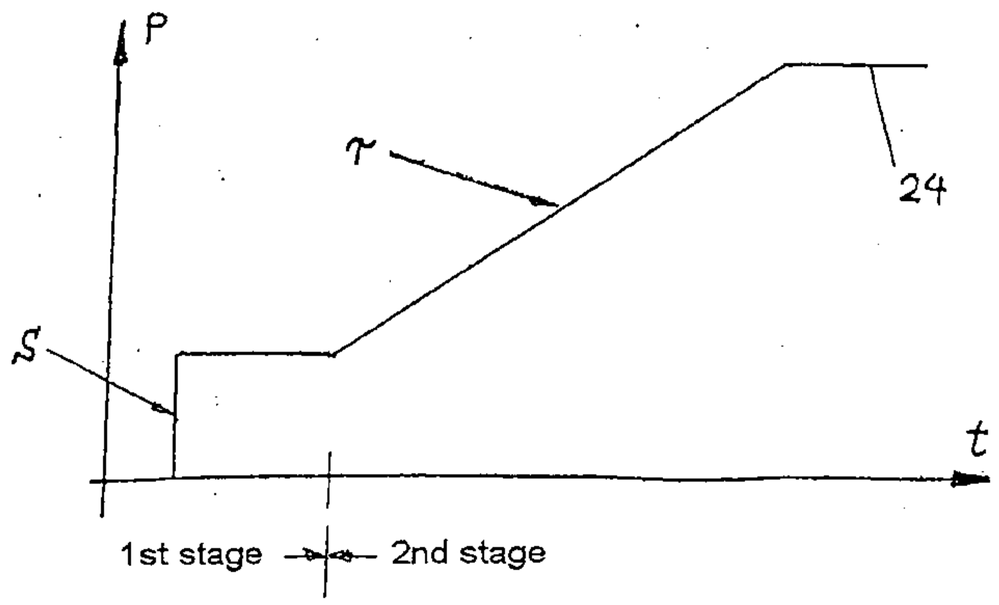
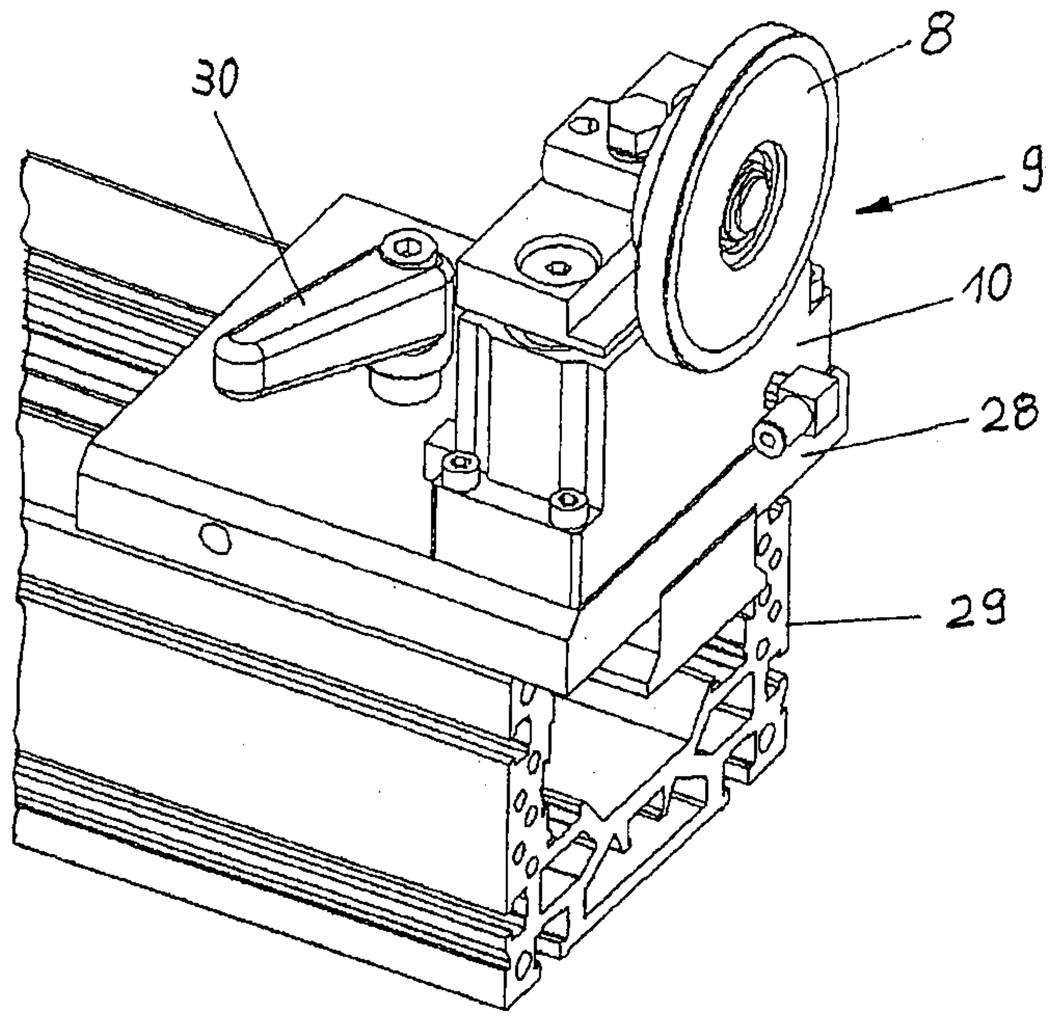
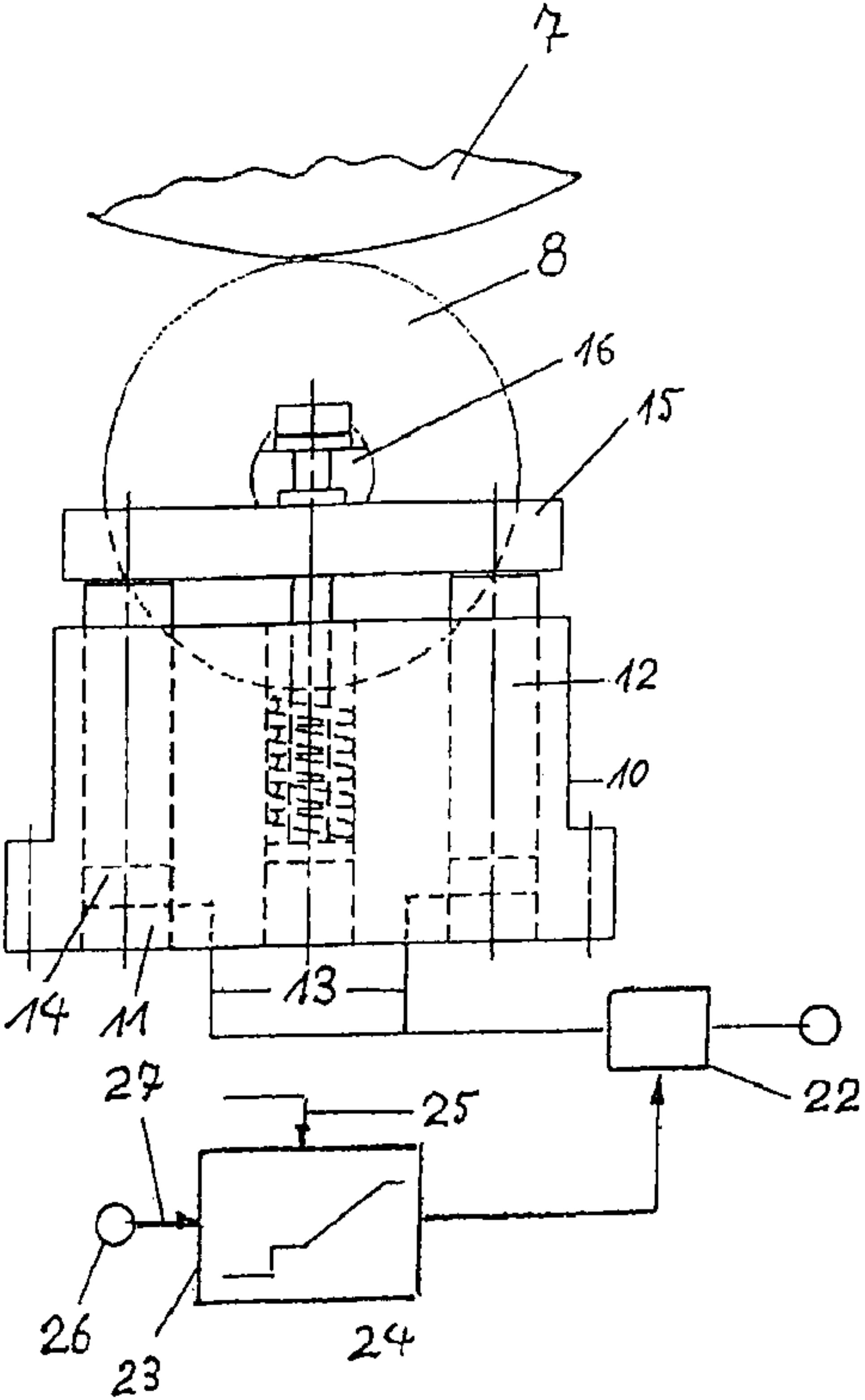


FIG. 5

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