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(54) **Wrapping film package, wrapping method and wrapping machine**

(57) A wrapping film package in which the two opposite end faces (15a, 15b) of an object (14) to be wrapped are covered with a length of protective film (35) and a length of wrapping film band (28) is wrapped around the object. In the wrapping method, the end of the protective film is lifted onto the object to be wrapped, whereupon a length of wrapping film is wrapped over it.

The second end of the severed protective film sheet is lifted onto the second end portion of the object, whereupon a length of wrapping film is wrapped over it. The wrapping machine (10) comprises devices (30, 40) supplying and cutting a protective film sheet and lifting its ends onto the object to be wrapped and a wrapping apparatus (20).

EP 1 162 144 A2

Description**SUBJECT OF THE INVENTION**

[0001] The invention relates to a wrapping film package, a wrapping method and a wrapping machine. Using the wrapping method and the wrapping machine, the two opposite end faces of an object to be wrapped can be covered with protective film and the object can be wrapped with a length of wrapping film band.

STATE OF THE ART

[0002] By the wrapping method, an object to be wrapped can be wrapped with protective plastic so as to form around it a layer which protects the object during transport and storage. However, by the wrapping method it is difficult to have the object completely wrapped up because the wrapping cannot be carried on to the end faces of the object being packaged. If one or both of the end faces of the object being wrapped is to be protected, then the end face or faces are provided with separate sheets of protective film, e.g. of durable plastic film. The edges of the sheets on the end faces are turned onto the sides of the object so that, when the object is being wrapped, they remain under the protective film, such as a plastic film band, wrapped around the object or between different layers of wrapping material. At the end of the wrapping operation, the topmost plastic film layers of the wrapping are seamed together and the plastic film band reeled off a roll is severed.

[0003] To place the sheets of plastic film onto the end faces of the object to be wrapped, many methods can be employed. In order to achieve as tight a package as possible, a length of plastic film band is usually wound around the object to be wrapped to form a film layer on it before a protective sheet is set on the end face. The wrapping operation is then usually interrupted to allow a protective sheet to be placed on the end face, whereupon the wrapping operation can be continued. If protective sheets have to be placed on both lateral faces or on the top and bottom faces, then the wrapping method will become very complicated and difficult to apply.

OBJECT OF THE INVENTION

[0004] The object of the present invention is to achieve a new wrapping film package, wrapping method and wrapping machine which do not have the drawbacks described above and which allow an object to be completely wrapped in protective film and wrapping film in a new way.

FEATURES CHARACTERISTIC OF THE WRAPPING FILM PACKAGE OF THE INVENTION

[0005] The wrapping film package of the invention is characterized in that

- the two opposite end faces of the object to be wrapped are covered with the same sheet of protective film which, in addition to covering the end faces, also covers the bottom face of the object, forming an additional protective layer on it for transport and removal situations,
- and that the object has been wrapped with wrapping film band so that the wrapping film covers that portion of the protective film sheet which is under the bottom of the object to be wrapped as well as the ends of the protective film sheet turned over the object to be wrapped.

FEATURES CHARACTERISTIC OF THE METHOD OF THE INVENTION

[0006] The wrapping method of the invention is characterized in that the wrapping method comprises the following steps:

- in a wrapping station, the end of a protective film band is drawn from a roll to a position in front of the object to be wrapped,
- the object to be wrapped is moved in the wrapping station so that the end of the protective film band goes over a first end portion of the object to be wrapped, whereupon a length of wrapping film band is wrapped around the first end portion of the object to be wrapped,
- the protective film band is severed and the object to be wrapped is moved so that the second end of the protective film sheet comes onto a second end portion of the object to be wrapped, whereupon a length of wrapping film band is wrapped around the second end portion of the object to be wrapped,
- and the object to be wrapped is wrapped with a length of wrapping film band.

[0007] The continuous protective film extending over the two opposite end faces of the object to be wrapped now also extends to the bottom side or to a lateral side of the object. In a package, an additional film layer under the wrapping plastic layer provides an advantage especially when one of the surfaces of the object to be wrapped needs to be more effectively protected than usual. By placing this additional film layer on the bottom face of the package, the package is rendered substantially more durable in situations where the object is transported or moved. Thus, especially packages containing heavy objects, such as e.g. stacks of steel sheets, will be substantially better equipped to withstand lifting e.g. by a forklift truck.

EMBODIMENTS OF THE METHOD OF THE INVENTION

[0008] According to a preferred embodiment of the method of the invention,

- the first end of the protective plastic film protecting the end faces of the object to be wrapped is placed mainly onto a first end face or lateral face of the object to be wrapped, whereupon a length of protective plastic film band is wound around the object to be wrapped at least in the region near this end face or lateral face so that the first end of the protective film remains in place under the protective plastic film band wrapped around the object or between different layers of it,
- the second end of the protective plastic film protecting the end faces is placed onto the opposite end or lateral face of the object to be wrapped, whereupon a length of protective plastic film band is wound around the object to be wrapped so that the second end of the protective plastic film remains in place under the protective film band wrapped around the object or between different layers of it.

[0009] According to a second preferred embodiment of the method of the invention,

- the object to be wrapped is moved into the wrapping station with its first end face first so that the object to be wrapped comes to lie at least partly over the protective plastic film protecting the end faces and the first end of the protective film protecting the end faces extends over the first end face of the object to be wrapped to its upper face,
- a length of protective plastic film band is wound around the object to be wrapped at least in the region near its first end face,
- the second end of the protective plastic film is lifted over the opposite end face of the object to be wrapped onto its upper face,
- a length of protective plastic film band is wound around the object to be wrapped in the region near this second end face, too, so that the entire object to be wrapped will be protected.

[0010] According to a third embodiment of the method of the invention,

- after the first end portion has been wrapped, the protective plastic film band forming the wrapping is seamed and severed,
- the protective plastic film protecting the end faces and supplied from a roll is severed and the object to be wrapped is conveyed out of the wrapping station,
- the second end of the protective plastic film protecting the end faces is lifted over the second end face of the object to be wrapped onto its upper face, whereupon the second end is wrapped and the wrapping film band is seamed and severed.

[0011] Yet another preferred embodiment of the invention is characterized in that

- in the wrapping station, the end of the protective film band is pulled from the roll from below in an upward direction so as to bring it to a position in front of the object to be wrapped,
- that the object to be wrapped is moved in the wrapping station so that the first end of the object pushes the protective film band reeled off the roll before it,
- the object to be wrapped is moved in the wrapping station far enough for the protective film band reeled off the roll to cover, in addition to the end face of the first end portion of the object to be wrapped, at least part of the upper and lower faces of said end portion,
- that a length of wrapping film band is wrapped around the first end portion of the object to be wrapped so that at least part of the protective film band covering the lower and upper faces of the first end portion remains under a wrapping film layer,
- that the wrapping film band is seamed and severed,
- that the protective film band reeled off the roll is cut off at a point far enough from the object to be wrapped to leave with the object to be wrapped a protective film sheet that is longer than the object,
- that the object to be wrapped is moved with its first end first at least partially out of the wrapping station so that at least part of the protective film sheet remains under the object to be wrapped, between the object and a conveyor,
- that the trailing end of the protective film sheet now lying near the second end of the object to be wrapped is lifted to a level above the upper part of the object to be wrapped,
- that the object to be wrapped is moved back into the wrapping station with the second end first far enough to cause the trailing end of the protective film sheet to turn onto the second end portion of the object to be wrapped, so that, in addition to the end face of the second end portion of the object to be wrapped, the protective film sheet also covers at least part of the upper and lower faces of said end portion,
- that a length of wrapping film band is wrapped around the second end portion of the object to be wrapped so that at least part of the protective film sheet covering the lower and upper faces of the second end portion remains under a wrapping film layer,
- and that a length of wrapping film band is wrapped around the object to be wrapped.

[0012] The essential point about the method of the invention is that the wrapping process is continuous and flexible. As the protective film protecting the end faces of the object to be wrapped is supplied from a roll and is cut into an appropriate length depending on the size of the object to be wrapped, this method can be used to wrap up objects of widely varying sizes.

APPARATUS OF THE INVENTION

[0013] The invention also pertains to a wrapping machine comprising a wrapping system for wrapping a protective plastic film band around an object to be wrapped.

FEATURES CHARACTERISTIC OF THE APPARATUS OF THE INVENTION

[0014] The wrapping machine of the invention is characterized in that the wrapping machine comprises

- a device for pulling the end of a protective film band from a roll to a position in front of an object to be wrapped,
- a device for moving the object to be wrapped so that the end of the protective film band goes over a first end portion of the object to be wrapped,
- a device for wrapping a length of the wrapping film band around the first end portion of the object to be wrapped,
- a device for taking the trailing end of the protective film sheet onto a second end portion of the object to be wrapped,
- a device for wrapping a length of wrapping film band around the second end portion of the object to be wrapped,
- and a device for wrapping a length of wrapping film band around the object to be wrapped.

EMBODIMENTS OF THE APPARATUS OF THE INVENTION

[0015] According to a preferred embodiment of the apparatus of the invention, the wrapping machine comprises a mechanism for providing the object to be wrapped with a protective film covering both end faces and the bottom of the object.

[0016] According to a second preferred embodiment of the apparatus of the invention, the wrapping machine comprises a device for adding a protective film under the bottom and onto both end faces of the object to be wrapped.

[0017] According to a third preferred embodiment of the apparatus of the invention, the wrapping machine comprises

- a reel for protective film band intended for the protection of the end faces of the object to be wrapped,
- a device for passing the end of the protective film band under the bottom of the object to be wrapped and over its first end portion,
- a cutting device for severing the protective film band,
- and a lifting device for lifting the severed end of the protective film sheet onto the second end portion of the object to be wrapped,

[0018] Yet another preferred embodiment of the apparatus of the invention is characterized in that the wrapping machine comprises

- a device for pulling the end of the protective film band from a roll from below in an upward direction to a position in front of the object to be wrapped,
- a device for moving the object to be wrapped so that the first end portion of the object is in the wrapping station,
- a device for covering the first end portion of the object to be wrapped with protective film band so that the end of the protective film band reeled off a roll below the object to be wrapped is over the first end portion of the object and that, in addition to covering the end face of the first end portion of the object to be wrapped, the protective film band also covers at least part of the upper and lower faces of said end portion,
- a device for wrapping the first end portion of the object to be wrapped with wrapping film band so that at least part of the protective film band covering the lower and upper faces of the first end portion remains under a wrapping film layer,
- a device for seaming and severing the wrapping film band,
- a device for severing the protective film band coming from the roll at a point far enough from the object to be wrapped for the object to be left with a protective film sheet that is longer than the object,
- a device for moving the object to be wrapped with its first end first at least partially out of the wrapping station so that at least part of the protective film sheet remains under the object to be wrapped, between the object and a conveyor,
- a device for lifting the trailing end of the protective film sheet lying near the second end of the object to be wrapped to a level above the upper part of the object to be wrapped,
- a device for moving the object to be wrapped backward so that the second end portion is in the wrapping station,
- a device for bringing the trailing end of the protective film sheet onto the second end portion of the object to be wrapped so that, in addition to covering the end face of the second end portion of the object to be wrapped, the protective film sheet also covers at least part of the upper and lower faces of said end portion,
- a device for wrapping a length of wrapping film band around the second end portion of the object to be wrapped so that at least part of the protective film sheet covering the lower and upper faces of the second end portion remains under a wrapping film layer,
- a device for wrapping a length of wrapping film band around the object to be wrapped.

[0019] As the apparatus of the invention comprises no separate devices for covering the two end faces, it is compact, simple and reliable in operation.

EXAMPLES OF EMBODIMENTS

[0020] In the following, the invention will be described in detail by the aid of a few examples of its embodiments with reference to the drawings, wherein

LIST OF DRAWINGS

[0021]

Fig. 1 presents a wrapping machine according to the invention in side view.
Fig. 2 - 8 correspond to Fig. 1, illustrating different stages of a wrapping operation.

DESCRIPTION OF DRAWINGS

[0022] Fig. 1 presents a wrapping machine 10 provided with conveyors 11, 12 and 13 for moving an object to be wrapped into and out of a wrapping station 20. The wrapping station 20 comprises a wrapping apparatus with a circular wrapping ring known in itself, by means of which the object to be wrapped, placed on conveyor 12, is wrapped with plastic film band. In Fig. 1, the circular wrapping apparatus 21 is only shown in a diagrammatic form. The figure shows a rotating ring 22 and a roll 23 of plastic film band. The object is wrapped in a known manner by bringing it onto the conveyor 12 in the wrapping station 20 and then wrapping a length of pre-stretched thin plastic film band from the roll 23 around both the object and the conveyor 12. After the wrapped object has been moved away from the conveyor 12 in the wrapping station 20 onto an outlet conveyor 13, the plastic film contracts and tightens around the object to be wrapped.

[0023] The essential point about the wrapping machine 10 in Fig. 1 is that the wrapping station 20 also comprises an apparatus 30 for protecting the end faces of the object to be wrapped, comprising a plastic film roll 31, a device 32 for cutting the band, a gripper 33 and a mechanism 40 for lifting the end of the plastic film. The operation of these elements will be described in greater detail in connection with the following figures.

[0024] Fig. 2 illustrates a situation where the an object 14 to be wrapped has been moved by the inlet conveyor 11 to position near the wrapping station 20. The first step in the wrapping process is that the gripper 33 moves down along a guide rail 24 to a device 23 for severing the band, whereupon the gripper 33 takes hold of the end of the protective film band supplied from the plastic film band roll 31. The plastic film band on roll 31 may be substantially thicker than the shrinkable plastic band on the wrapping plastic roll 23.

[0025] While the gripper 33 is moving down along the

guide rail 24, a photosensitive cell 34 mounted on the gripper 33 measures the height of the object 14 to be wrapped. This height measurement is needed for determining the height of the end face 15 of the object 14 to be wrapped, this measurement being needed for the calculation of the length of the continuous plastic sheet required for covering both end faces 15.

[0026] In Fig. 3, the gripper 33 has been moved up along the guide rail 24, the gripper 33 simultaneously pulling up a length of plastic film 35 from the roll 31. Next, the conveyor 11 moves the object 14 to be wrapped into the wrapping station 20. The forward end face 15a of the object 14 to be wrapped is now pressed against the plastic film 35, pushing the film 35 before it. The plastic film band roll 31 rotates freely, continuously supplying more plastic film 35. When the object 14 to be wrapped in Fig. 3 has advanced far enough for its forward end face 15a to touch the flexible flap 26, the plastic film 35 is squeezed between the end face 15a and the flap 26. As the object 14 to be wrapped moves further right in Fig. 3, the plastic film 35 remains in contact with the surface of the object 14 while the advancing object 14 continues pulling more plastic film 5 from the roll 31.

[0027] In Fig. 4 it can be seen that the forward end portion of the object 14 to be wrapped has advanced into the rotating wrapping ring 22 in the wrapping station. The gripper 33 has moved somewhat downward along the guide rail 24, and as the object 14 has been moving, the gripper 33 has released its hold of the end 36 of the plastic film 35. However, the flexible flap 26 attached to the gripper 33 presses the end of the plastic film 35 as the upper surface of the object 14, keeping the plastic film 35 in place on the surface of the object 14. As the object 14 moves right in Fig. 4, more plastic film 35 is supplied from the plastic film roll 31 so that the plastic film 35 covers part of the upper surface of the object 14, its forward end face 15a and almost the entire bottom face 16. After this, the ring-like wrapping apparatus 21 wraps a length of thin wrapping plastic film 28 over the plastic film 35 already on the surface of the object 14. At this stage, the conveyor 12 in the wrapping station 20 also remains inside the wrapping.

[0028] After the forward portion of the object 14 has been wrapped sufficiently, the topmost layers 28 of wrapping plastic band are seamed together and the plastic band is severed in a known manner. Next, the partially wrapped object 14 is moved from conveyor 12 onto the outlet conveyor 13 and thus out of the wrapping station 20. During this movement, the cutting device 32 for severing the plastic film band 35 cuts off the band 35 at a point such that the sheet of plastic film covering the forward end face 15a and the bottom face 16 will be long enough to cover the hind end face 15b and the adjacent area of the upper surface of the object 14 as well.

[0029] Fig. 5 presents a situation where a partially wrapped object 14 has been moved from the wrapping station 20 onto the outlet conveyor 13. During the exit movement, the cutting device 32 for severing the plastic

film band 35 has cut off the plastic film band, whose trailing end 37 is lying free on the conveyor 12 in the wrapping station 20. To allow the hind end face 15b and the adjacent portion of the object 14 to be wrapped, the plastic film band 35 has to be lifted against the end face 15b so that the end 37 of the plastic film band extends over the object 14. For this purpose, a lifting device 41 comprised in a mechanism (40) for lifting the end of the plastic film moves down along a guide rail 25 so that the plastic film 35 remains squeezed between an upper bar 42 and a supporting bar 43. The lifting device 41 is provided with hooks 44, by means of which the supporting bar 43 can be lifted up. Attached to the upper bar 42 is a brush 45, which is designed to keep the plastic film between the upper bar 42 and the film supporting bar 43 suitably tensioned when the plastic film 35 is sliding through the gap between these bars.

[0030] In Fig. 6, the lifting device 41 comprised in the mechanism for lifting the end of the plastic film has been moved downward along the guide rail 25 so that the plastic film 35 remains between the upper bar 42 and the film supporting bar 43. At the same time, the hooks 44 have engaged the film supporting bar 43 so that both bars 42 and 43 can be lifted up simultaneously.

[0031] In Fig. 7, the lifting device 41 and the 42 and 43 connected to it have been raised to a higher position along the guide rail 25. The plastic film 35 is sliding through the gap between the bars 42 and 43. However, the brush 45 keeps the plastic film band 35 at a suitable tightness so that the object to be wrapped 14 can be moved left in Fig. 7 toward the wrapping station 20. As the object to be wrapped 14 is advancing under the film supporting bar 43, the end 37 of the plastic film 35 is bent over onto the upper surface of the object 14. As the object 14 continues moving on, the flexible flap 27 attached to the lifting device 41 presses the plastic film 35 and its end 37 tightly against the upper surface of the object to be wrapped 14.

[0032] In Fig. 8, the portion adjacent to end face 15b of the object to be wrapped has been brought to a position within the circular wrapping apparatus 21, to be wrapped with plastic film 28. As can be seen from the figure, the end 37 of the plastic film 35 covering the end faces 15a and 15b as well as the bottom face of the object 14 is pressed by the flexible flap 27 against the upper surface of the object 14. Wrapping can now be started, the object 14 as well as the conveyor 12 in the wrapping station 20 being covered by the plastic film band 28. After this end portion of the object 14 has been wrapped up and the wrapping plastic 28 seamed and cut off, the result is an object 14 completely wrapped up with tight plastic layers 35 and 28 covering it on all sides. After this, the object 14 is removed from the wrapping station onto the outlet conveyor 13, whereupon the wrapping plastic layers 28 left loose to accommodate the wrapping station conveyor 12 shrink tightly over the plastic film sheet 35 covering the end faces 15a and 15b of the object 14.

[0033] After the object 14 has been wrapped up and removed from the wrapping station 20, the lifting apparatus 40 for lifting the end of the plastic film returns the film supporting bar 43 back to the low position in which it is supported by the supporters 46. The hooks 44 of the lifting device 41 are released from the film supporting bar 43 and the lifting device returns to its high position to be ready for the next object to be wrapped. The wrapping machine 10 is now again in a condition of readiness as illustrated in Fig. 1, ready to wrap the next object.

[0034] It is obvious to the person skilled in the art that the embodiments of the invention may be varied within the scope of the following claims.

Claims

1. Wrapping film package in which the two opposite end faces (15a, 15b) of an object (14) to be wrapped are covered with a length of protective film (35) and a length of wrapping film band (28) is wrapped around the object,

characterized in

- **that** the two opposite end faces (15a, 15b) of the object (14) to be wrapped are covered with the same sheet of protective film (35) which, in addition to the end faces, also covers the bottom face of the object, forming an additional protective layer on it for transport and removal situations,
- and **that** the object (14) is wrapped with wrapping film band (28) so that the wrapping film covers that portion of the protective film sheet (35) which is under the bottom (16) of the object to be wrapped as well as the ends (36, 37) of the protective film sheet turned over the object to be wrapped.

2. Wrapping method, whereby in a wrapping station (20) the two opposite end faces (15a, 15b) of an object (14) to be wrapped are covered with a length of protective film (35) and a length of wrapping film band (28) is wrapped around the object,

characterized in that the wrapping method comprises the following steps:

- in the wrapping station (20), the end (36) of a protective film band (35) is drawn from a roll (31) to a position in front of the object (14) to be wrapped,
- the object (14) to be wrapped is moved in the wrapping station (20) so that the end of the protective film band (35) goes over a first end portion of the object to be wrapped, whereupon a length of wrapping film band (28) is wrapped around the first end portion of the object to be wrapped,

- the protective film band (35) is severed and the object (14) to be wrapped is moved so that the trailing end (37) of the protective film sheet comes onto a second end portion of the object to be wrapped, whereupon a length of wrapping film band (28) is wrapped around the second end portion of the object to be wrapped, 5
- and the object (14) to be wrapped is wrapped with a length of wrapping film band (28). 10

3. Wrapping method as defined in claim 2, **characterized in**

- **that** in the wrapping station (20), the end (36) of the protective film band (35) is pulled from the roll (31) from below in an upward direction so as to bring it to a position in front of the object (14) to be wrapped, 15
- **that** the object (14) to be wrapped is moved in the wrapping station (20) so that the first end of the object pushes the protective film band (35) reeled off the roll (31) before it, 20
- **that** the object (14) to be wrapped is moved in the wrapping station (20) far enough for the protective film band (35) reeled off the roll (31) to cover, in addition to the end face (15a) of the first end portion of the object to be wrapped, at least part of the upper and lower (16) faces of said end portion, 25
- **that** a length of wrapping film band (28) is wrapped around the first end portion of the object (14) so that at least part of the protective film band (35) covering the lower face (16) and the upper face of the first end portion remains under a wrapping film layer, 30
- **that** the wrapping film band (28) is seamed and severed, 35
- **that** the protective film band (35) reeled off the roll (31) is cut off at a point far enough from the object (14) to be wrapped to leave with the object a protective film sheet that is longer than the object, 40
- **that** the object (14) to be wrapped is moved with its first end first at least partially out of the wrapping station (20) so that at least part of the protective film sheet (35) remains under the object to be wrapped, between the object and a conveyor (13), 45
- **that** the trailing end (37) of the protective film sheet (35) lying near the second end of the object (14) to be wrapped is lifted to a level above the upper part of the object to be wrapped, 50
- **that** the object (14) to be wrapped is moved backward into the wrapping station (20) with the second end first far enough to cause the trailing end (37) of the protective film sheet (35) to turn onto the second end portion of the object to be wrapped, so that, in addition to covering the end 55

- face (15b) of the second end portion of the object to be wrapped, the protective film sheet (35) also covers at least part of the upper face and lower face (16) of said end portion,
- **that** a length of wrapping film band (28) is wrapped around the second end portion of the object (14) to be wrapped so that at least part of the protective film sheet (35) covering the lower face (16) and upper face of the second end portion remains under a wrapping film layer,
- and **that** a length of wrapping film band (28) is wrapped around the object (14) to be wrapped.

4. Wrapping machine (10), comprising an apparatus (30) for covering the two opposite end faces (15a, 15b) of an object (14) to be wrapped with a protective film (35) and a wrapping apparatus (20) for wrapping a length of wrapping film band (28) around the object, **characterized in that** the wrapping machine (10) comprises

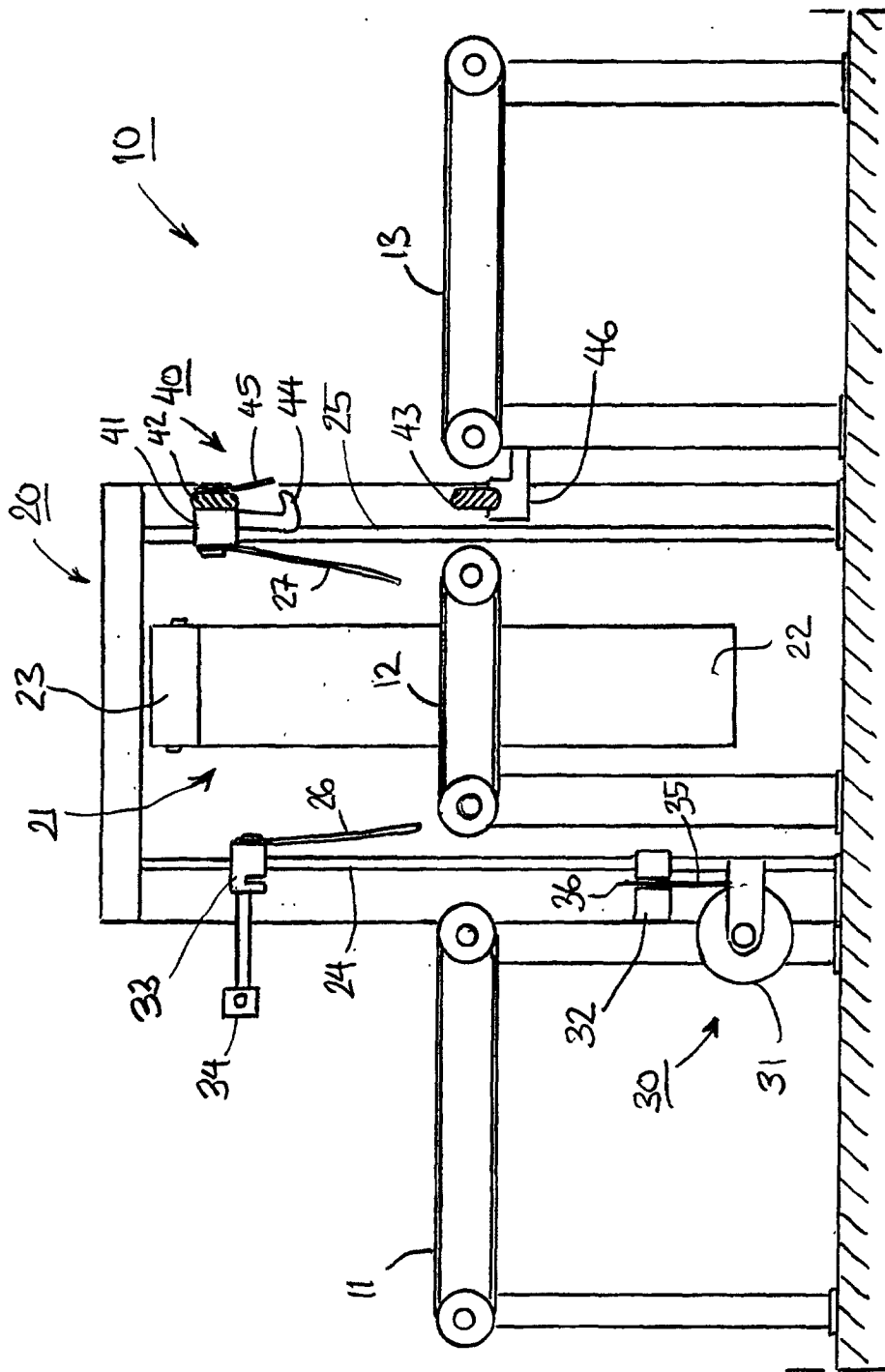
- a device (33) for pulling the end of a protective film band (35) from a roll (31) to a position in front of the object (14) to be wrapped,
- a device (11), (12) for moving the object (14) to be wrapped so that the end (36) of the protective film band goes over a first end portion of the object to be wrapped,
- a device (23) for wrapping a length of the wrapping film band (28) around the first end portion of the object to be wrapped,
- a device (42, 43, 45) for taking the trailing (37) end of the protective film sheet (35) onto a second end portion of the object (14) to be wrapped,
- a device (23) for wrapping a length of wrapping film band (28) around the second end portion of the object (14) to be wrapped,
- and a device (23) for wrapping a length of wrapping film band (28) around the object (14) to be wrapped.

5. Wrapping machine (10) as defined in claim 4, **characterized in that** the wrapping machine (10) comprises

- a device (33) for pulling the end (36) of the protective film band (35) from a roll (31) from below in an upward direction to a position in front of the object to be wrapped,
- a device (11), (12) for moving the object (14) to be wrapped so that the first end portion of the object is in the wrapping station (20),
- a device (26) for covering the first end portion of the object (14) to be wrapped with a length of protective film band (35) so that the end (36)

- of the protective film band reeled off a roll (31) below the object lies over the first end portion of the object and that, in addition to covering the end face (15a) of the first end portion of the object to be wrapped, the protective film band also covers at least part of the upper face and lower face (16) of said end portion,
- a device (23) for wrapping the first end portion of the object (14) with a length of wrapping film band (28) so that at least part of the protective film band (35) covering the lower face (16) and upper face of the first end portion remains under a wrapping film layer,
 - a device (20) for seaming and severing the wrapping film band (28),
 - a device (32) for severing the protective film band coming from the roll (31) at a point far enough from the object (14) to be wrapped for the object to be left with a protective film sheet that is longer than the object,
 - a device (12, 13) for moving the object (14) to be wrapped with its first end first at least partially out of the wrapping station (20) so that at least part of the protective film sheet (35) remains under the object to be wrapped, between the object and a conveyor (13),
 - a device (42, 43, 45) for lifting the trailing end (37) of the protective film sheet (35) lying near the second end of the object (14) to be wrapped to a level above the upper part of the object to be wrapped,
 - a device (11, 12) for moving the object (14) backward so that the second end portion of the object is in the wrapping station (20),
 - a device (27) for bringing the trailing end (37) of the protective film sheet (35) onto the second end portion of the object (14) to be wrapped so that, in addition to covering the end face (15b) of the second end portion of the object, the protective film sheet also covers at least part of the upper face and lower face (16) of said end portion,
 - a device (23) for wrapping a length of wrapping film band (28) around the second end portion of the object (14) to be wrapped so that at least part of the protective film sheet (35) covering the lower face (16) and upper face of the second end portion remains under a wrapping film layer,
 - a device (23) for wrapping a length of wrapping film (28) band around the object (14) to be wrapped.

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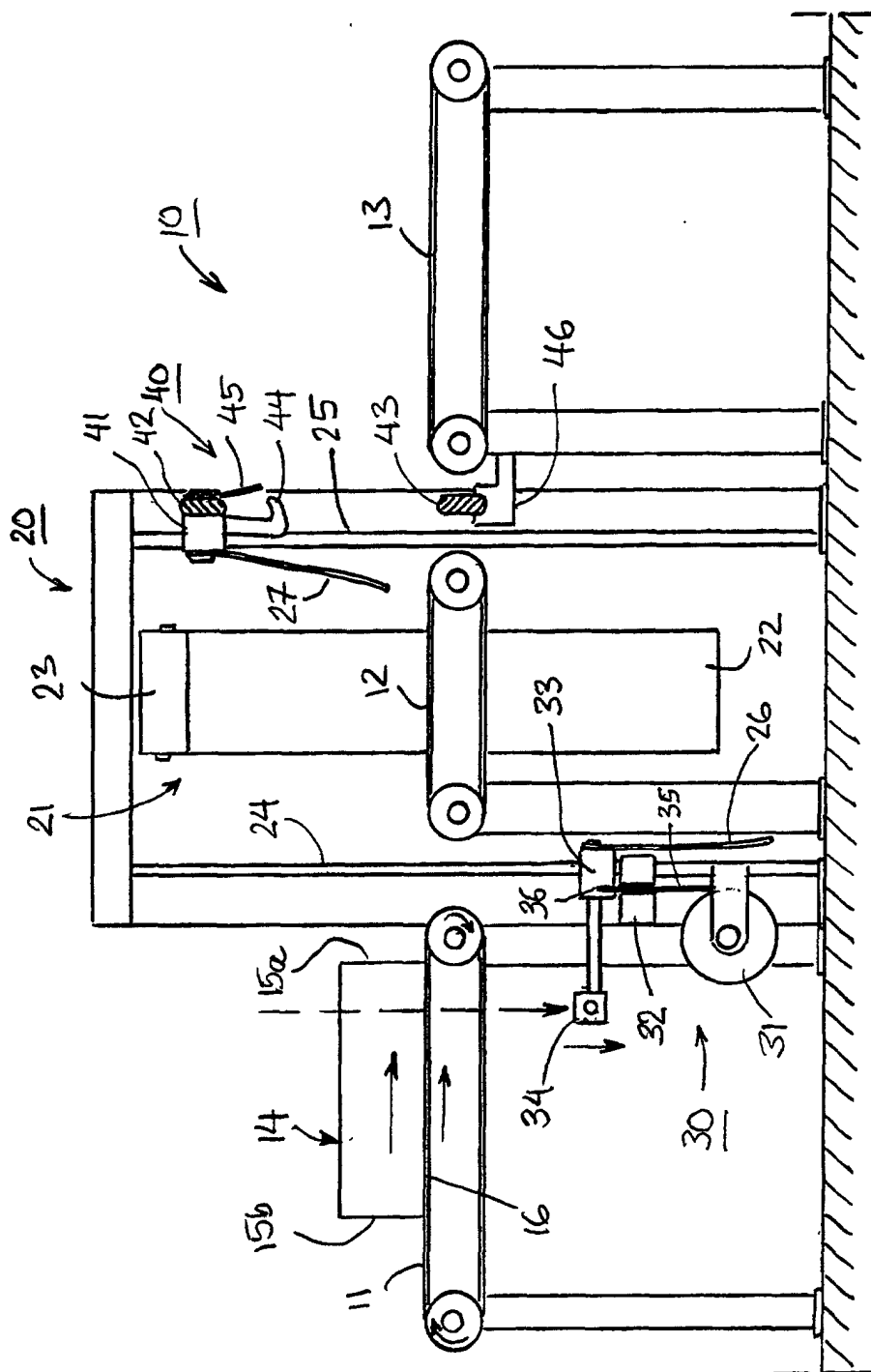


FIG. 2

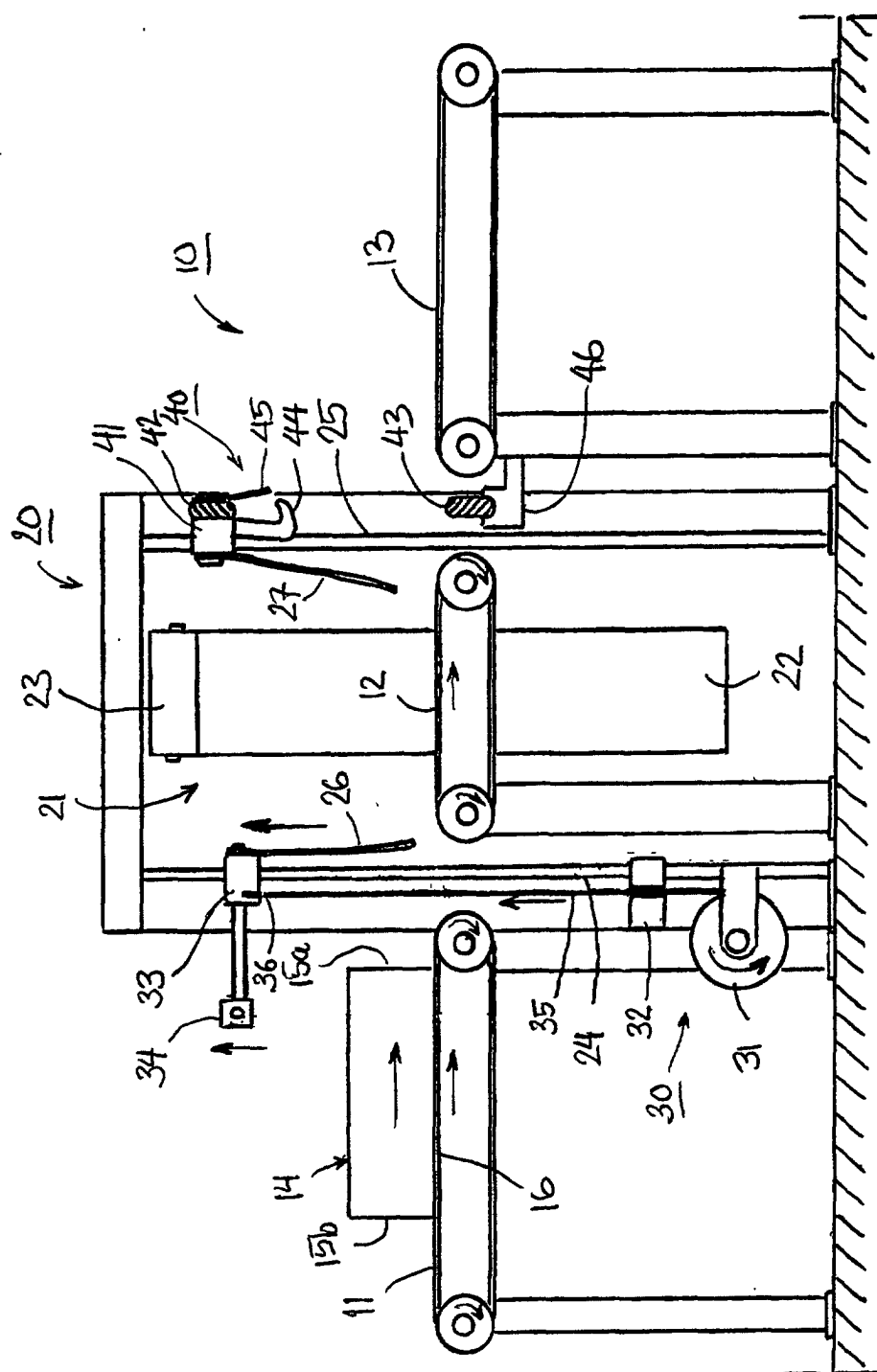


FIG. 3

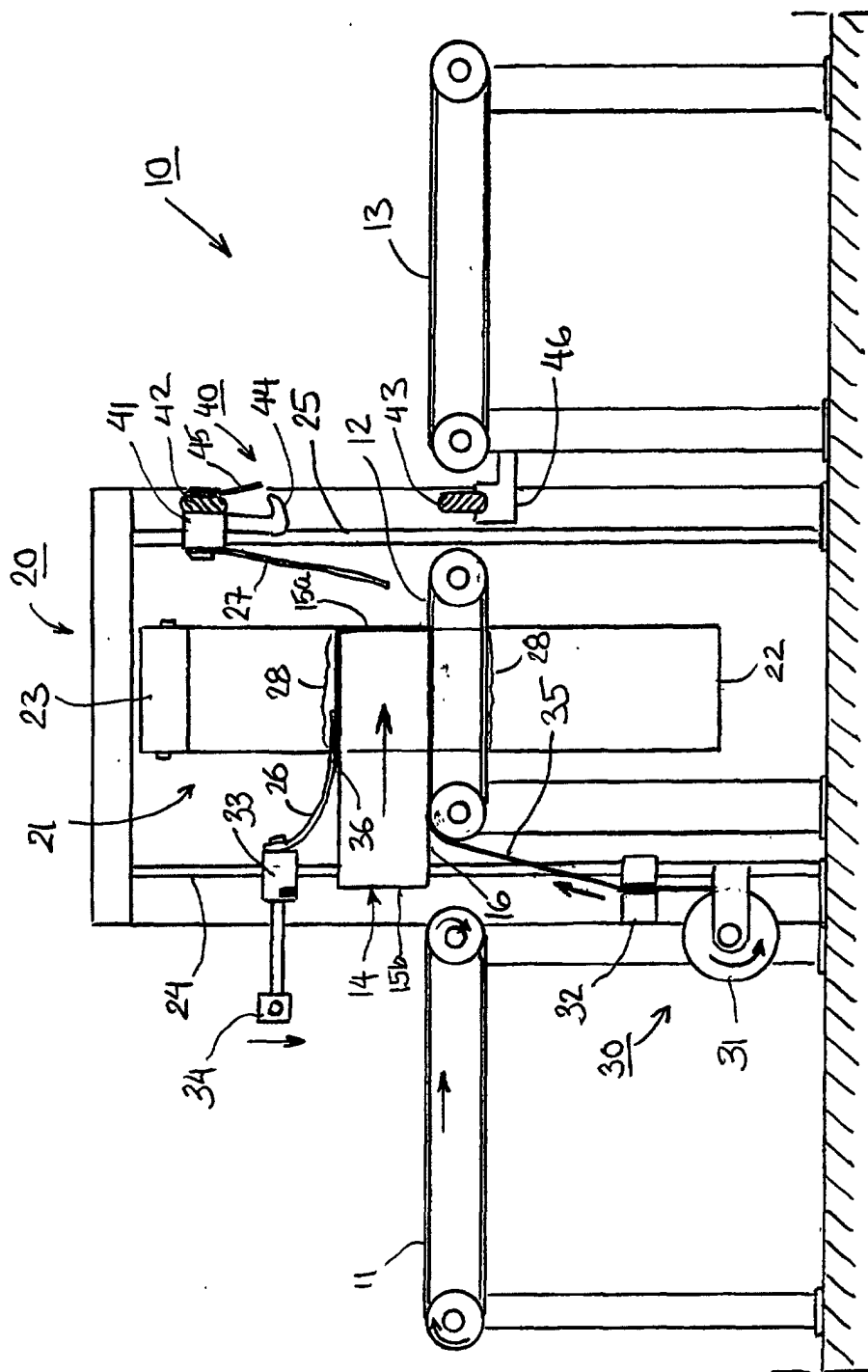


FIG. 4

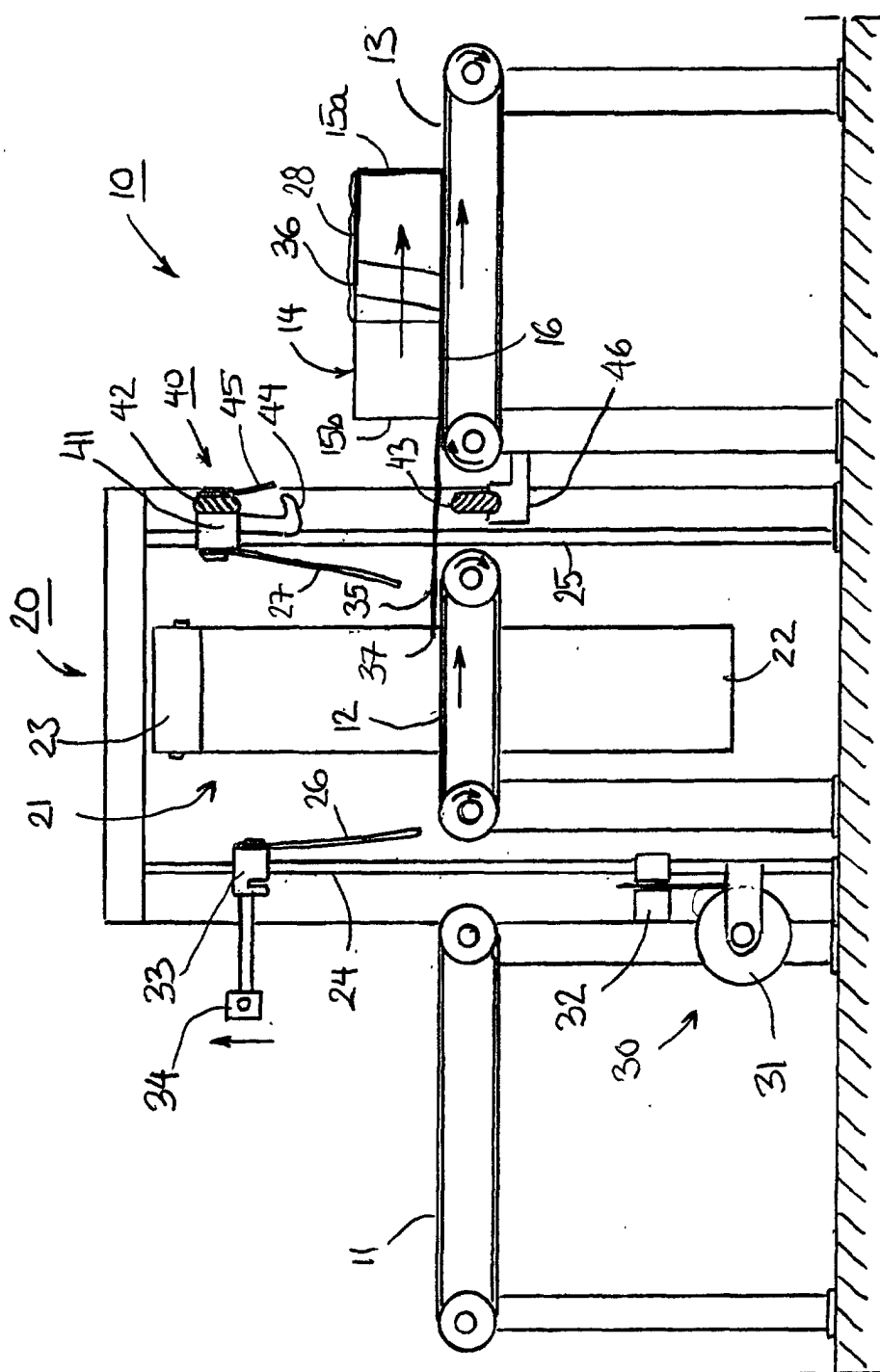


FIG. 5

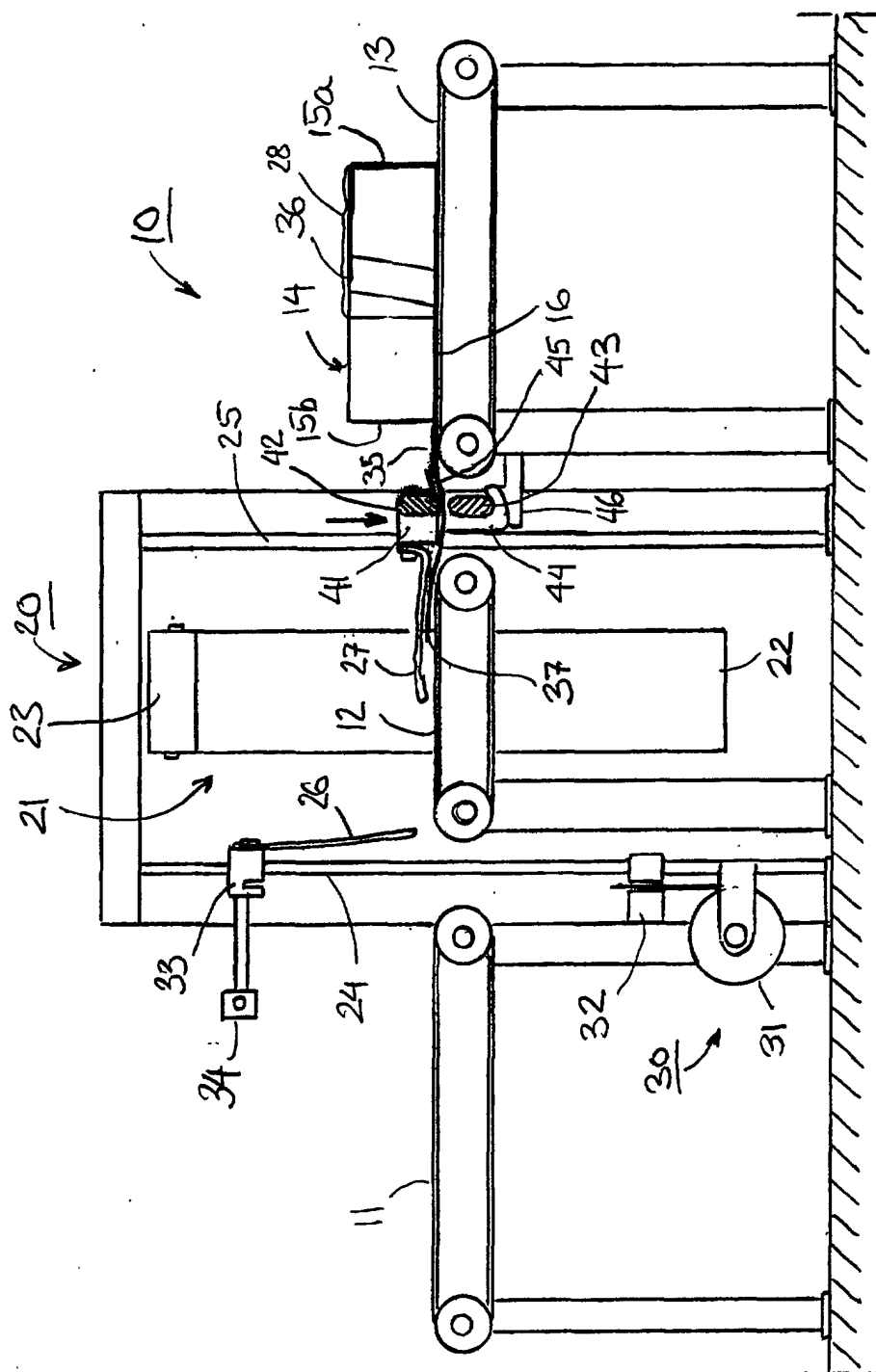


FIG. 6

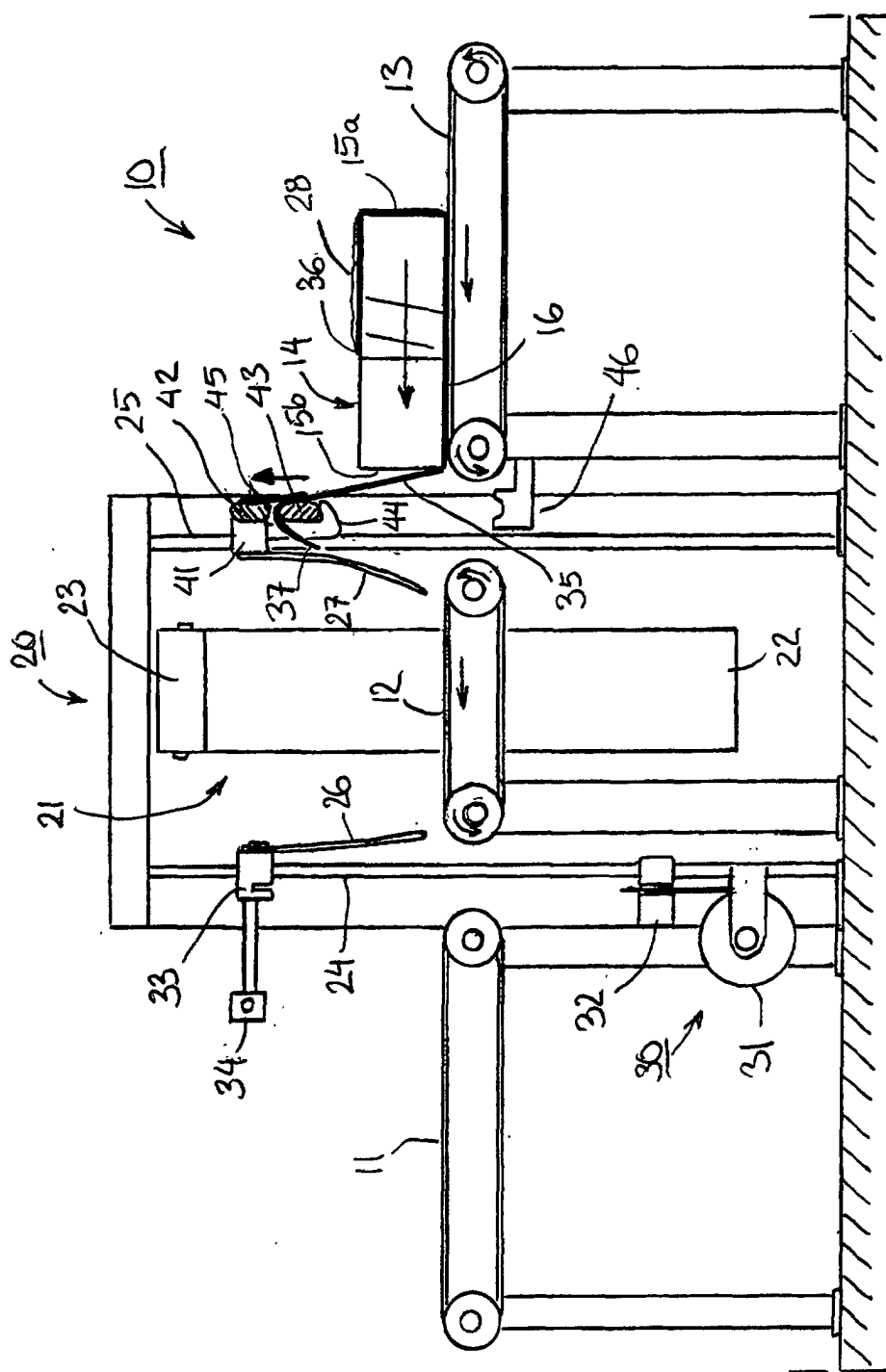


FIG. 7

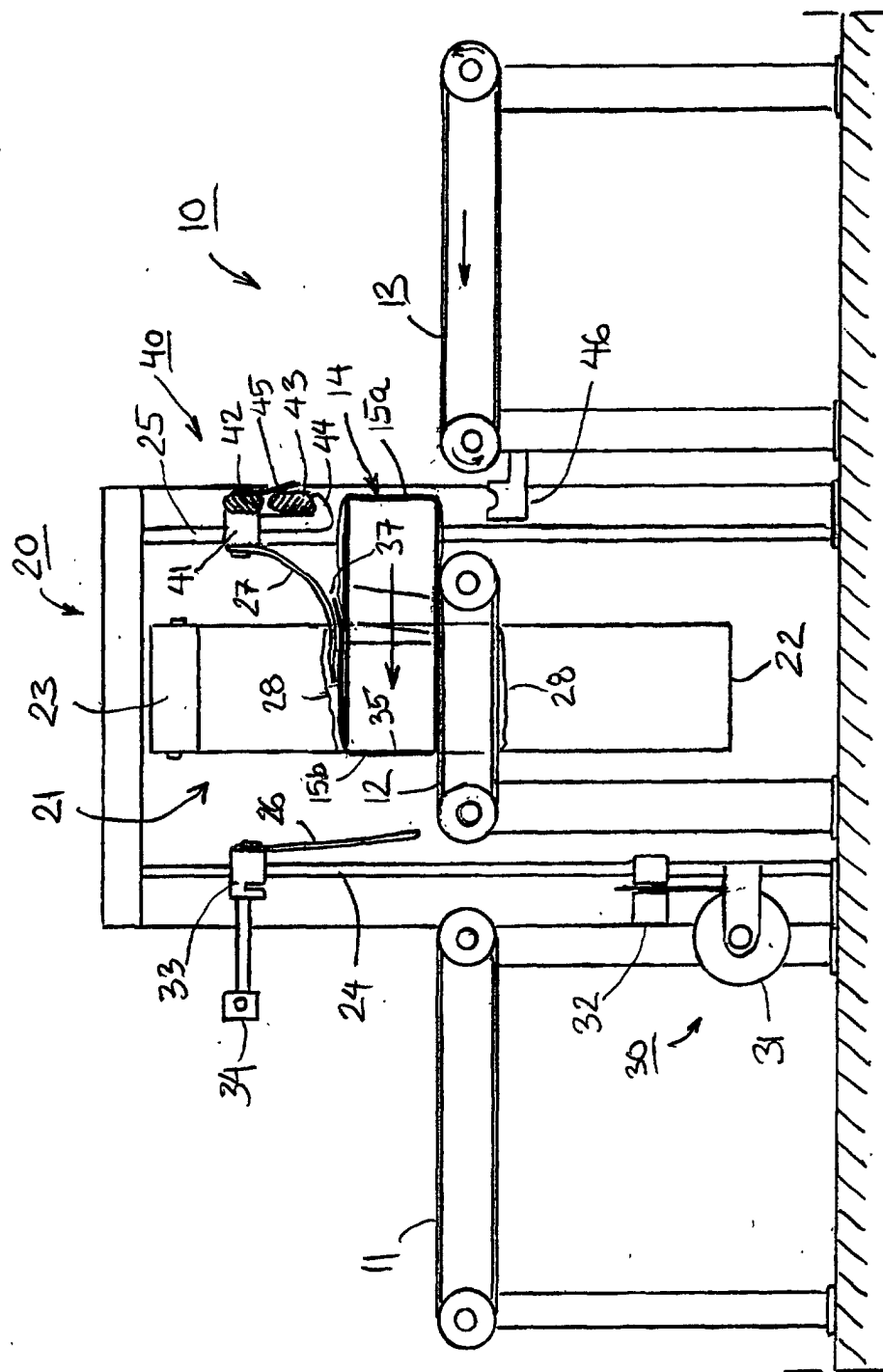


FIG. 8