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(71) Applicant: **Industria Grafica Meschi S.r.l.**
Via Pian di Rota, 2
I-57100 Livorno(IT)

(72) Inventor: **Meschi, Luciano**
Corso Amedeo, 73
I-57100 Livorno(IT)

(74) Representative: **Michelotti, Giuliano et al**
c/o SAIC BREVETTI S.r.l. Viale Bianca Maria 15
I-20122 Milano(IT)

(54) **Devices for collecting continuous paper webs and obtaining from them at least a pair of strips, everyone consisting of a plurality of printed forms.**

(57) Devices for collecting a continuous paper web (12) and for therefrom obtaining at least a pair of strips (24, 26) consisting of a plurality of forms, are disclosed.

The devices comprise, at the inlet, a station (20) for longitudinally cutting the web (12) into two strips (24, 26) and driving means for the web (12) advancement. The so formed strips (24, 26) freely each other meet in the air at a forwarding shaft (27) to which come in substantially superimposed condition and from which they depart because of at least a pair of forwarding bars (33, 33a) from which they come out to be forwardwd to a form collecting and stacking station.

Alternatively, the two so obtained strips (24, 26) are sent to two forwarding shafts (28, 30) substantially each other parallel and staggered along the advancing direction of the strips (24, 26) so that one (24) of the strips, which are freely coming down by gravity from the shafts (28, 30), results in advanced position with respect to the other one, and, after having formed a loop (44), is directly sent in a slot (38) of a crosspiece (40) downstream arranged with respect to said shafts (28, 30), the other strip (26), after having formed a loop (36) inside the the loop (44) of the first strip (24), is passed at first on a forwarding shaft (32) upstream arranged with respect to the crosspiece (40) and downstream arranged with respect to the shafts (28, 30) according to the advancing direction of the strips (24, 26) and then sent into the above mentioned slot (38) of the crosspiece (40) from which the strips (24, 26) come out in superimposed condition to be forwarded to forwarding means (48) provided at the outlet of the device to which are associated cutting means (50) for removing the punched lateral bands from the strips (24, 26).

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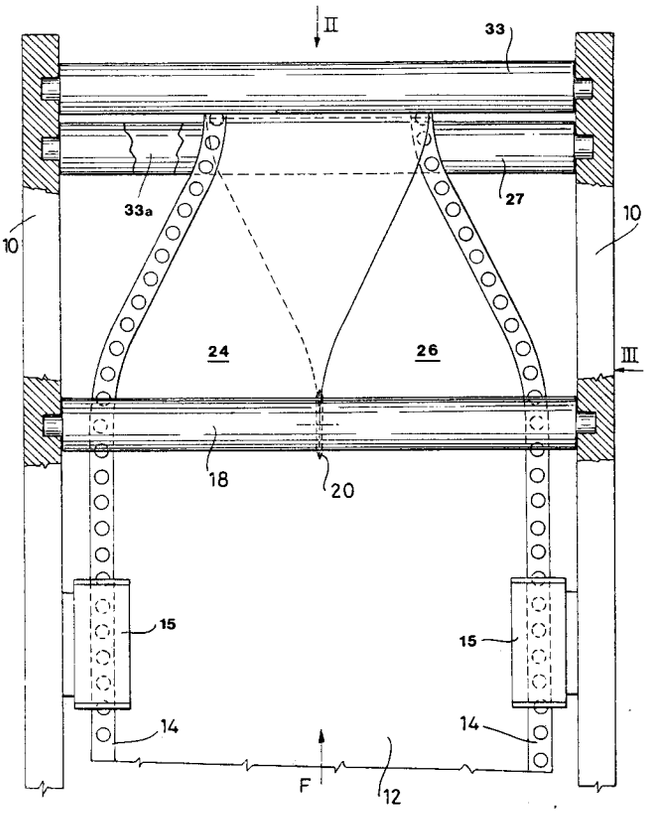

Fig.1

The present invention relates to a device for collecting a continuous paper web and obtaining therefrom at least a pair of strips everyone consisting of a plurality of printed forms.

It is well known that in the field of the production of printed forms one of the problems to which the design of machines in this specific field is specifically devoted is the obtainement of high productivity, i. e. the obtaiment of the highest the possible number of printed forms in the time unit.

Noticeable improvements have been obtained through the use of high speed printers, as for example the well known laser printers, but at this time the search has sought alternative solutions allowing, with the same performances provided by a laser printer, to however enhance the productivity in the above specified terms.

One of the most relevant problems coming from the use of printers is that deriving from the need of printing forms whose width, that is in practice the area formed by the written part of the form, is less than the total width of the paper strip web in the printer. The related disadvantages are considerable and, among other, must be listed the partial and incomplete use of the printer, as well as the great unused paper bulk forming a not neglibile waste with well apparent negative economic consequences.

It has been now devised and it is the suject matter of the present invention a device for the collection of a continuous paper web, and for obtaining therefrom at least a pair of strips everyone comprising a plurality of printed forms.

It has been also devised and is the subject matter of the present invention a device, which is fed at the inlet by a continuous web provided with multiple punching, for example with lateral punchings and a pair of substantially central punchings, said strip having two series of each other adjacent printed forms comprised between a lateral punching and a central one, being subsequentely said web cut according to a longitudinal line comprised between the two central punchings in order to obtain two strips of printed forms.

It is another object of the present invention to embody a device which is provided with drinving and moving means of the strips allowing them to come out of the device in perfectely superimposed condition in order to be forwarded to form treatment and stacking station.

The first device according to the invention is provided with driving means for the advancement of the paper web and strips, as well as with driving means for the last ones and forwarding them to a collecting and stacking station of the forms.

By means of the above device it is possible to print the paper web on the whole width with two series of adjacent forms having thinner width and proceed to the severing of a series of forms from the other one by means of a longitudinal cut of the web obtaining a pair of strips, everyone of them being formed by one of the two form series.

The first device according to the present invention, having at the inlet at least a longitudinal web cut station, is characterized in that comprises substantially at said inlet station, driving means for the advancement of the web for its feeding to the device, the two strips obtained from the above mentioned web being forwarded to at least a forwarding shaft on which they move in substantially superimposed condition, being arranged downstream of said forwarding shaft, further driving means for advancing the strips which are moved, always in substantially superimposed condition,between at least a pair of forwarding bars before their meeting at a collecting and stacking station of the forms.

The second device according to the invention, comprising, in a inlet station of the above mentioned web, means for the longitudinal cut thereof, the web having at least a pair of lateral punchings and at least a pair of substantially central punchings, being said device provided at the inlet and at the outlet of driving means for controlling respectively the advancement of the web into the device and the coming out of the strips therefrom, is caracterized in that the cutting means are arranged in order to effect the cut of the web along a line comprised between said two substantially central punchings, the two so obtained strips being sent on two forwarding shafts substantially each other parallel and staggered along the advancing direction of the strips so that one of said strips, which freely come down by gravity from said forwarding shafts, results in advanced position with respect to the other one, said strip, after having formed a loop, being directly sent into a slot of a crosspiece downstream arranged with respect to said forwarding shafts, the other strip, after having formed a loop internal with respect to the loop of the first strip, is moved firstly on a further forwarding shaft upstream arranged with respect to said crosspiece and downstream with respect to said forwarding shafts according to the advancing direction of the strips and then sent into the slot of said crosspiece from which the strips come out in superimposed condition to be forwarded to said moving means provided at the outlet of the device to which are associated cutting means for removing the punched lateral bands from the above mentioned strips.

The features as well as the advantages of the devices according to the present invention will result apparent from the following detailed description of not limiting embodiments thereof made with reference to the enclosed figures, in which:

Figure 1 is a frontal schematic view of a first embodiment of the device according to the present invention;

Figure 2 is a schematic horizontal view acoording to the arrow II of figure 1 of the first embodiment of the device according to the invention;

Figure 3 is a schematic lateral view according to the arrow III of figure 1 of the same first embodiment of the device;

Figure 4 is a schematic perspective view of a second embodiment of the device according to the present invention; and

Figure 5 is a partial schematic view in cross-section of the same second embodiment of the device according to the invention.

Referring to figures 1 to 3, the device according to the first embodiment of the invention comprises a fixed frame, of which for obvious depicting reasons, are depicted just the lateral walls 10.

The numeral 12 indicates a continuous paper web coming, according to the direction of the arrow F in figure 1, from a not depicted printer and is provided, in a well known manner, with two punched, removable edges or lateral bands 14 by which its advancement is driven by generally known moving means usually mentioned as "tractors" which are indicated by the numeral 15 and, being per se well known, are just schematically and not in detail depicted.

The device acording to the invention comprises, at the inlet, a fixed crosspiece 18 fastened at the ends to the side walls 10 of the frame, in the central portion of which, i. e. at the longitudinal centerline of the web 12, are fastened cutting means 20 consisting, for example, by a rotating circular blade, specifically a selfsharpening blade.

As it is seen in figure 1, the tractors 15 advancing the web 12 are arranged a little upstream with respect to the crosspiece 18 according to the advancing direction of the web 12 in order to obtain a proper centering thereof with respect to the cutting means 20.

The central longitudinal continuous cut of the web 12 forms two paper strips having substantially the same width of which the left one in figure 1 is indicated by the numeral 24, while the right one is indicated by the numeral 26.

According to one of the features of the present invention, the paper web 12 is printed on the whole width and, more specifically, on the area of the web 12 corresponding to the strip 24 is printed a first form series, while on the remaining area of the corresponding to the other strip 26 is printed a second form series. The forms are each other severable as they are, in a well known manner, each other connected by transversal punching lines (not depicted).

As it is seen, always referring to figure 1, the two paper strips 24, 26, during their upward advancement each other meet to the center of the device passing on a substantially horizontal forwarding shaft 27 fastened at the ends to the side walls 10 of the device. The strips 24, 26 pass on the forwarding shaft 27 and run thereon each other superimposed. According to this particular embodiment, for obtaining the best running conditions of the strip 26, which in this case is taht in touch with the shaft 27, the external surface thereof will undergo a proper treatment for minimizing friction, as for example a chromium-plating. However, it is selfevident that the shaft 27 can be also turnable around its longitudinal axis and, according to this alterative embodiment, its ends can be properly housed in ball bearings into the side walls 10.

Still referring to figures 2 and 3, it is seen that the strips 24 and 26 are now advancing according to the direction of the arrow G in figure 2, along a substantially horizontal path.

The advancement of the strips 24, 26 to further herebelow disclosed forwarding means is actuated by other advancement driving means or "tractors" of which the one acting on the lateral punched band 14 of the strip 24, i. e. on the left lateral punched band 14 in figure 2, is indicated by the numeral 29, while the other tractor acting on the punched band 14 of the strip 26, i. e. on the right punched band in figure 2, is indicated by the numeral 31.

It is selfevident that the actuation of the tractors 15, 29 and 31 will be perfectely synchronous in order to obtain a proper advancement of both the web 12 and the strips 24 and 26.

Further the synchronization of the above mentioned tractors allows a proper tensioning of the web 12 and the strips 24 and 26 and, above all, the maintenance of a proper superimposition of the above mentioned strips.

What above disclosed is properly obtained because both the web 12 and the strips 24, 26, during the almost whole path in the device, are provided with the punched lateral bands 14 which assure a proper driving and advancing of the above members.

As it is specifically seen in figures 2 and 3, at the outlet station of the strips 24 and 26 from the device, and specifically a little upstream with respect to the last one according to the advancing direction of the strips, are provided well known means (not depicted) removing the lateral punched bands 14 from the strips 24, 26.

The so obtained strips are presently sent to the outlet station of the device which comprises at least a pair of forwarding bars 33, 33a between which are passed the strips 24, 26 in substantially each other superimposed condition. As regards the

connection of these bars to the walls 10 hold what disclosed for the shaft 27.

As it is specifically depicted in figure 3, the strips 24, 26, once they leave the forwarding bars 33, 33a come down by gravity according to the arrow H of figure 3 in direction of a well known treating station for the forms (not depicted) provided with means for severing them and for forwanding and stacking them in a collecting station (also not depicted).

From what above disclosed, they result the advantages coming from the use of the device according to the present invention which is specifically of very simple construction and of reliable operation. It is to realize that both the paper web 12 and the strips 24 and 26 are properly driven during their substantially whole advancement into the device and both the web and the strips are not submitted to specifical strains compromising their integrity.

Reference is now made to figures 4 and 5 in which it is seen that the second device comprises an inlet station, indicated as a whole by the numeral 11, which is fed, according to the direction of the arrow F in figure 4, with a many punched web 12 having a pair of lateral punchings 14 and a pair of central punchings 16. The web 12 comes from a printing maschine (not depicted).

The lateral punchings 14 are engaged by well known moving means, generally indicated as "tractors", not visible in the inlet station 11 as they are hidden by the web 12 itself and by the frame 19 of the device. Anyway, said moving means, further to be per se known so that their depiction would be superfluous, are of the same kind of other "tractors" provided downstream of the device and just schematically depicted.

The inlet station 11 is also provided with cutting means 20 consisting, for example, of a rotating blade of selfsharpening kind. The above blade is suited for effecting a longitudinal cut 22 of the web 12 comprised between the two central punchings 16, producing two strips 24, 26 having substantially the same width everyone of which is comprised between a lateral punching 14 and a central punching 16 of the web 12. On both the strips 24, 26 is printed a series of forms, the ones of a strip being severed from the ones of the other strip so that the whole printable width of the web 12 allowed to obtain a form number substantially double of that obtainable by printing forms having the same width of the above mentioned web.

Everyone of the strips 24, 26 is now directed on a proper forwarding shaft from which comes down by gravity. Specifically, the strip 24 is passed on a first shaft 28, while the other strip 26 is passed on a second shaft 30 both supported at the ends by the frame 19. In order to reduce at a minimum the friction between the shafts 28, 30 and the strips 24, 26, said shafts can be fixed with a properly treated external surface, for example by chromium plating, or can be turnable and then supported by the frame 19 by means of ball bearings.

How it is seen also in figure 4, but more specifically in figure 5, the shafts 28, 30 are each other parallel and arranged at the same height. In such a way the strip 24, coming down from the shaft 28 in retracted position with respect to the shaft 30, will result advanced, with respect to the other strip 26, of a length substantially similar to the spacing between the shafts 28, 30.

The device of the second embodiment of the invention then comprises further forwarding and driving means of the strips 24, 26 which will be described with reference to figures 4 and 5.

The above mentioned means comprise a forwarding shaft 32 substained at the ends by brackets 34 integral with the frame 19. The shaft 32 may be either fixed or turnable on the brackets 34 as already specified for the shafts 28, 30.

On the shaft 32 is passed the strip 26 after having formed, between the shaft 30 and the sheft 32, underside with respect to the last one, a loop 36. The length of said loop will depend from the horizontal space between the shafts 30 and 32.

The strip is at last sent into a slot 38 provided in a crosspiece 40 supported by or integral with arms 42 forming an extension of the brackets 34 to the front area of the device. As it is specifically noticed in figure 4, the slot 38 is laterally right shifted on the crosspiece 40, so that the strip 26 does not undergo any diverting. From figure 5 it is specifically seen that the slot 38 is a little upward sloping according to the advancing direction of the strip 26 in order to have the last one fed to the subsequent driving means, herebelow disclosed, without any particular adjustment problem of the outlet direction from the crosspiece 40.

The strip 24, once is passed on the forwarding shaft 28, is directly sent into the slot 38 after having formed a loop 44. The length of said loop is longer than that of the loop 36 of the strip 26 because, as it is above seen, is more "advanced" than the strip 26, and is longer the horizontal spacing between the shaft 28 and the slot 38 with respect that between the shafts 30 and 32. Further the particular position of the slot 38, as above specified, is such that the strip 24 shifts gradually on the same forwarding direction of the strip 26 substantially starting from the forming area of the loops 36, 44. The strips 24 and 26 freely meet each other in the air till they are exactly each other superimposed into the slot 38.

The each other superimposed strips 24, 26 are at last sent to a final driving station, indicated as an

assebly by the numeral 46, in which a pair of "tractors" 48, engaging the punchings 14, 16 of the above mentioned strips, drive their advancement to a treating and stacking station of the forms per se well known and thus neither depicted nor disclosed.

The tractors 48 will be properly synchronized with those driving the advancement of the web 12, the formation of the loops 36 and 44 being effected by the specific configuration and arrangement of the above specified means for driving and forwarding the strips 24, 26.

The formation of the loops 36, 44 in an intermediate area of the device has particular importance in the scope of the present invention as the above mentioned loops are substantially "expansion means" to avoid strong and highly damaging strains to the strips 24 and 26 during their movement.

In the final station of the device are then arranged a pair of blades 50 providing to remove the two lateral bands of the strips 24, 26 for the elimination of the punched areas which is embodied in any way neither depicted nor disclosed.

At last it is clear that variations and/or changements will be made tho the devices according to the invention without going out from the coverage thereof.

Claims

1. Device for collecting a continuous paper web and for obtaining therefrom at least a pair of strips, everyone consisting of a series of printed forms, which comprises, at the inlet, at least a station for longitudinally cut the web, characterized by comprising, substantially at said inlet station, driving means (15) for the advancement of the web (12) for the feeding of the device, the two strips (24, 26) obtained from the web (12) being sent to at least a forwarding shaft (27) on which they run in substantially superimposed condition, downstream of said at least one forwarding shaft (27) being arranged further driving means (29, 31) for advancing the strips (24, 26) which are passed, always in substantially superimposed condition, between at least a pair of forwardind bars (33, 33a) before their forwarding to a collecting and stacking station of the forms.

2. Device, according to claim 1, characterized in that said strips (24, 26) freely each other meet in the air from the cutting station (20) to said at least one forwarding shaft (27) to which they come in substantially superimposed condition.

3. Device, according to claim 2, in which the continuous paper web (12) is provided with two lateral punched bands (14) engaging driving means (15) of the web (12), provided with protrusions for engaging the holes of said punched bands, characterized in that both the driving means (15) of the web (12) and the driving means (29, 31) of the strips (24, 26) consist of at least a pair of the above mentioned driving means.

4. Device, according to claim 1, characterized by comprising means for removing the punched lateral bands (14) from the strips (24, 26) arranged at said at least a pair of forwarding bars (33, 33a).

5. Device, according to claim 4, characterized in that said means for removing the lateral punched bands (14) from the strips (24, 26) are upstream arranged with respect said at least a pair of forwarding bars (33, 33a).

6. Device for collecting a continuous paper web, having multiple punching and for obtaining therefrom at least two strips everyone consisting by a series of printed forms, comprising, in an inlet station of the above mentioned web, means for the longitudinal cut thereof, having the web at least a pair of lateral punchings and at least a pair of substantially central punchings, being said device provided at the inlet and at the outlet with moving means, respectively, for driving the advancement of the web into the device and the coming out of the strips therefrom, characterized in that the cutting means (20) are arranged in such a way to effect the cutting of the web (12) along a line comprised between said two substantially central punchings (16), the two strips (24, 26) so obtained being sent on two forwarding shafts (28, 30) each other substantially parallel and staggered along the advancing direction of the strips (24, 26) so that one of said strips, freely coming down by gravity from said shafts (28, 30), results in advanced position with respect to the other one, said strip (24), after having formed a loop (44), being directly sent into a slot (38) of a crosspiece (40) downstream arranged with respect to said shafts (28, 30), the other strip (26), after having formed a loop (36) internal with respect to the loop (44) of the strip (24), being firstly directly passed on a forwarding shaft (32) arranged upstream with respect to said crosspiece (40) and downstream of said shafts (28, 30) according to the advancing direction of the strips (24, 26) and then sent into the above mentioned slot (38) of the crosspiece (40) from which come out in

superimposed condition to be forwarded to said moving means (48) provided at the outlet of the device to which are associated cutting means (50) for removing the lateral bands from the strips (24, 26).

7. Device, according to claim 6, characterized in that the two shafts (28, 30) are arranged at the same height on the fixed frame (19) of the device.

8. Device, according to claim 6, characterized in that said slot (38) is laterally displaced on the crosspiece (40), substantially along the advancing direction of one of the strips (24, 26) so that said strips (24, 26), being both sent into the slot (38), freely each other meet in the air till their superimposition in said slot (38).

9. Device, according to claim 6, characterized in that said forwarding shaft (32) and said crosspiece (40) are arranged at a heigth lower than that of the forwarding shafts (28, 30).

10. Device, according to claim 6, characterized in that said slot (38) is upward sloping according to the advancing direction of the strips (24, 26).

11. Device suitable to collect a continuous paper web and to obtain from it at least two strips everyone consisting of a series of printed forms, comprising in an inlet station of the above mentioned web, means for the longitudinal cut thereof along a substantially median line, said device being provided at the inlet and at the outlet with moving means respectively for driving the web advancing into the device and the strip coming out therefrom, characterized in that the two so obtained strips (24, 26) are sent to two forwarding shafts (28, 30) substantially each other parallel and staggered along the advancing direction of the strips (24, 26) so that one of said strips, freely coming down by gravity from said shafts (28, 30), results in advanced position with respect to the other one, said strip (24), after having formed a loop (44), being directly sent into a slot (38) of a crosspiece (40) downstream arranged with respect ot said shafts (28, 30), the other strip (26), after having formed a loop (36) inside the loop (44) of the strip (24), passing at first on a forwarding shaft (32) upstream arranged with respect to said crosspiece (40) and downstream arranged with respect to said shafts (28, 30) according to the advancing direction of the strips (24, 26) and then sent to the above mentioned slot (38) of the crosspiece (40) from which the strips (24, 26) come out in superimposed condition to be sent to said moving means (48) provided at the outlet of the device to which are associated cutting means (50) for removing the punched lateral bands from the strips (24, 26).

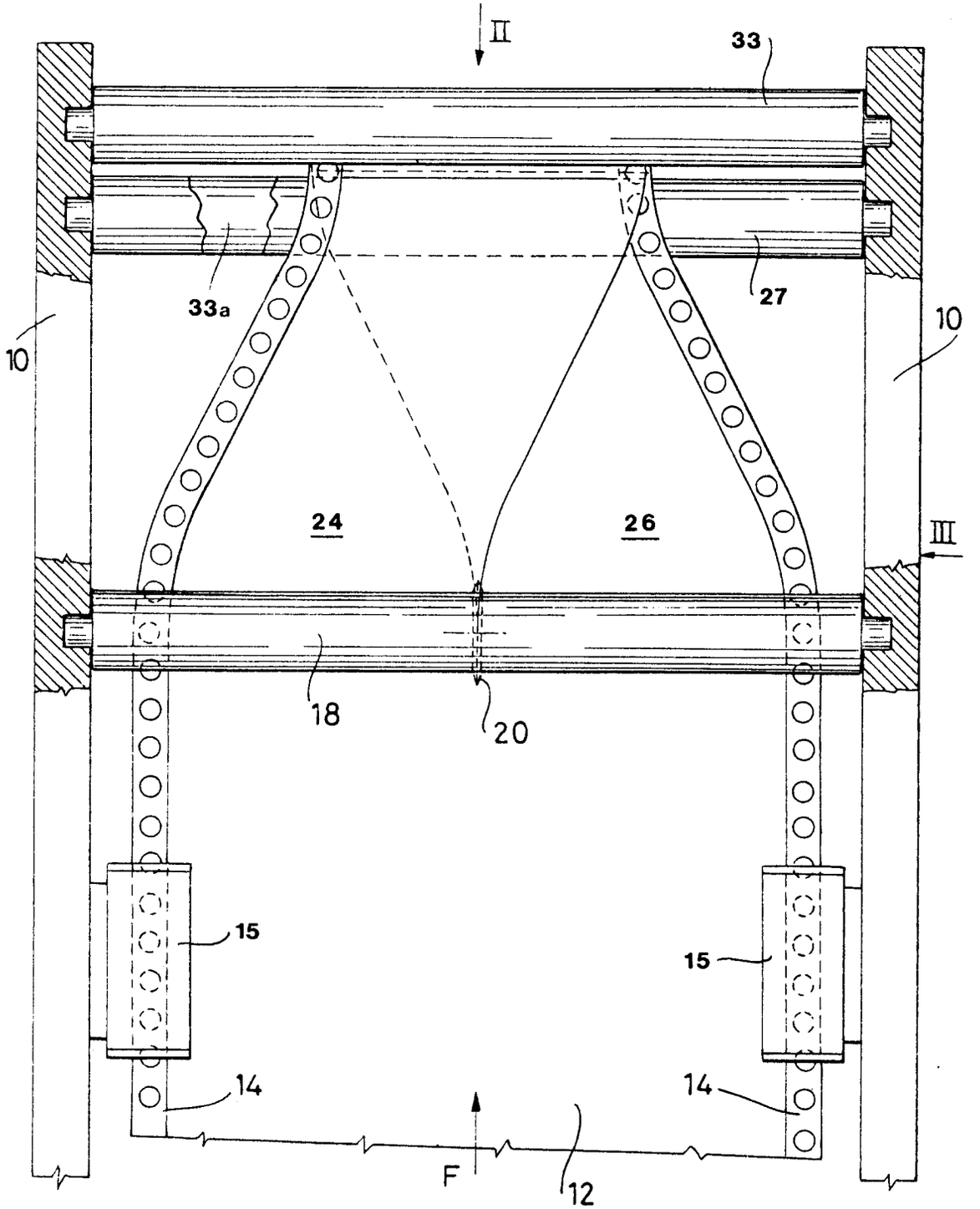

Fig.1

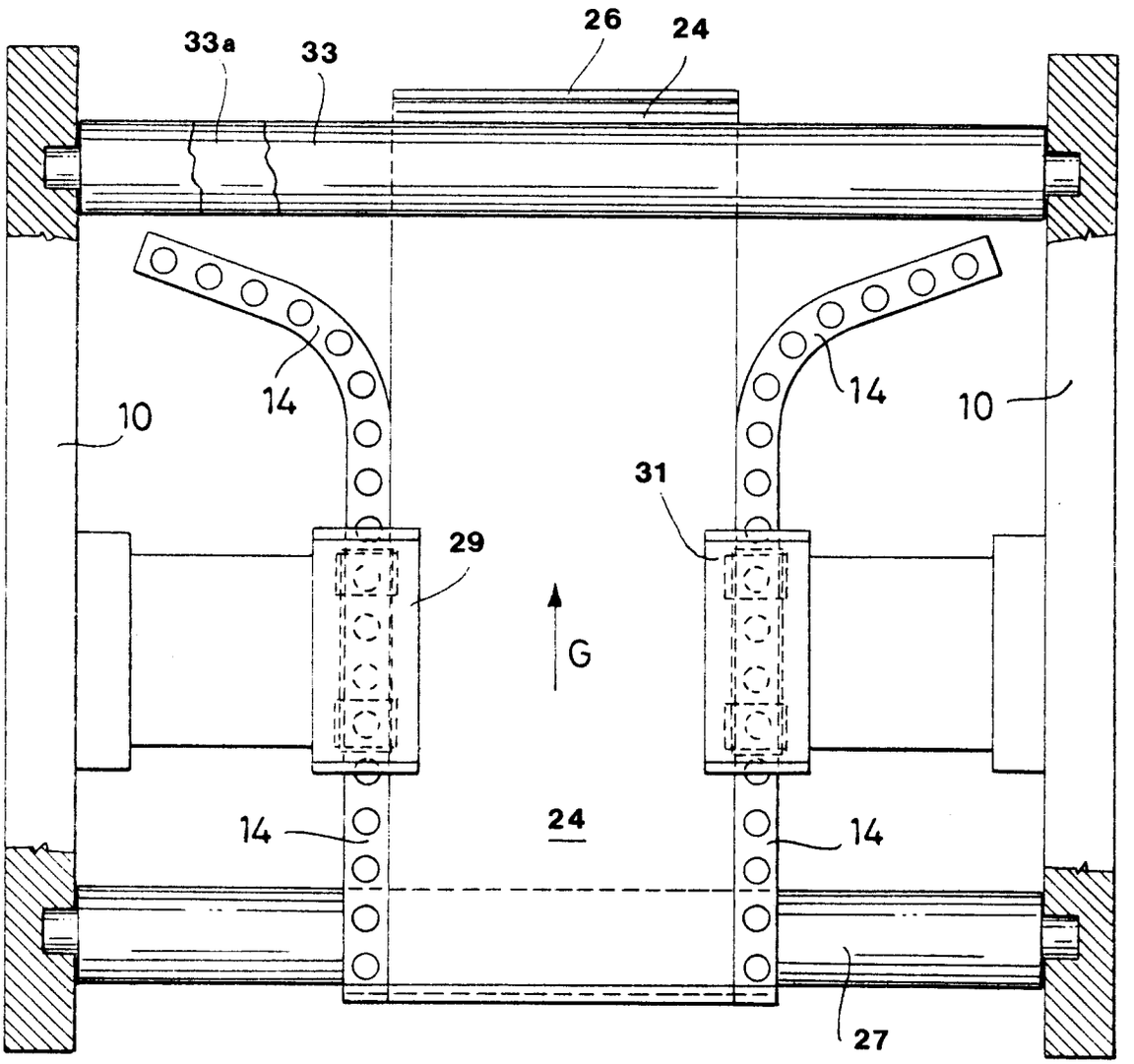

Fig.2

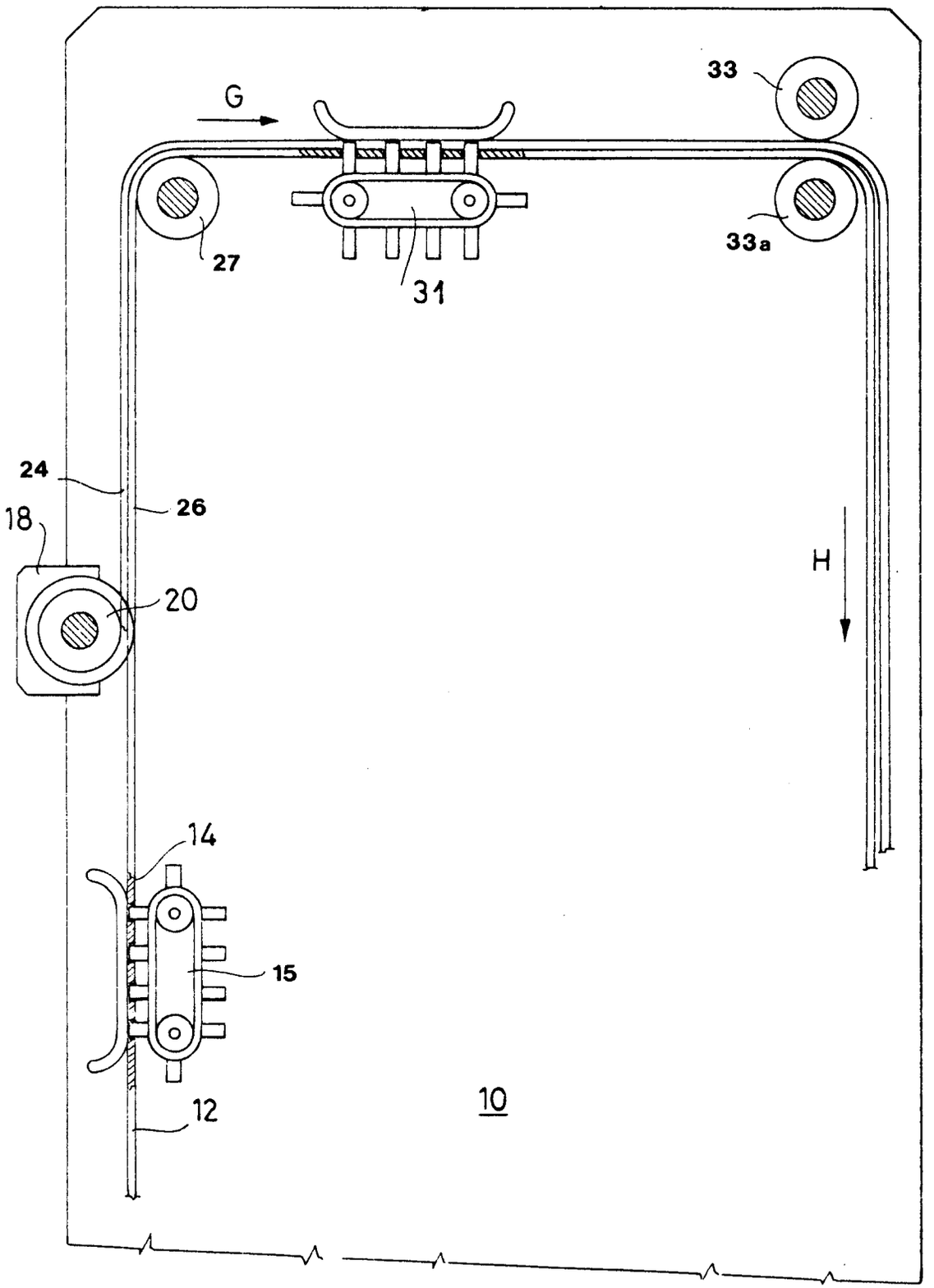

Fig.3

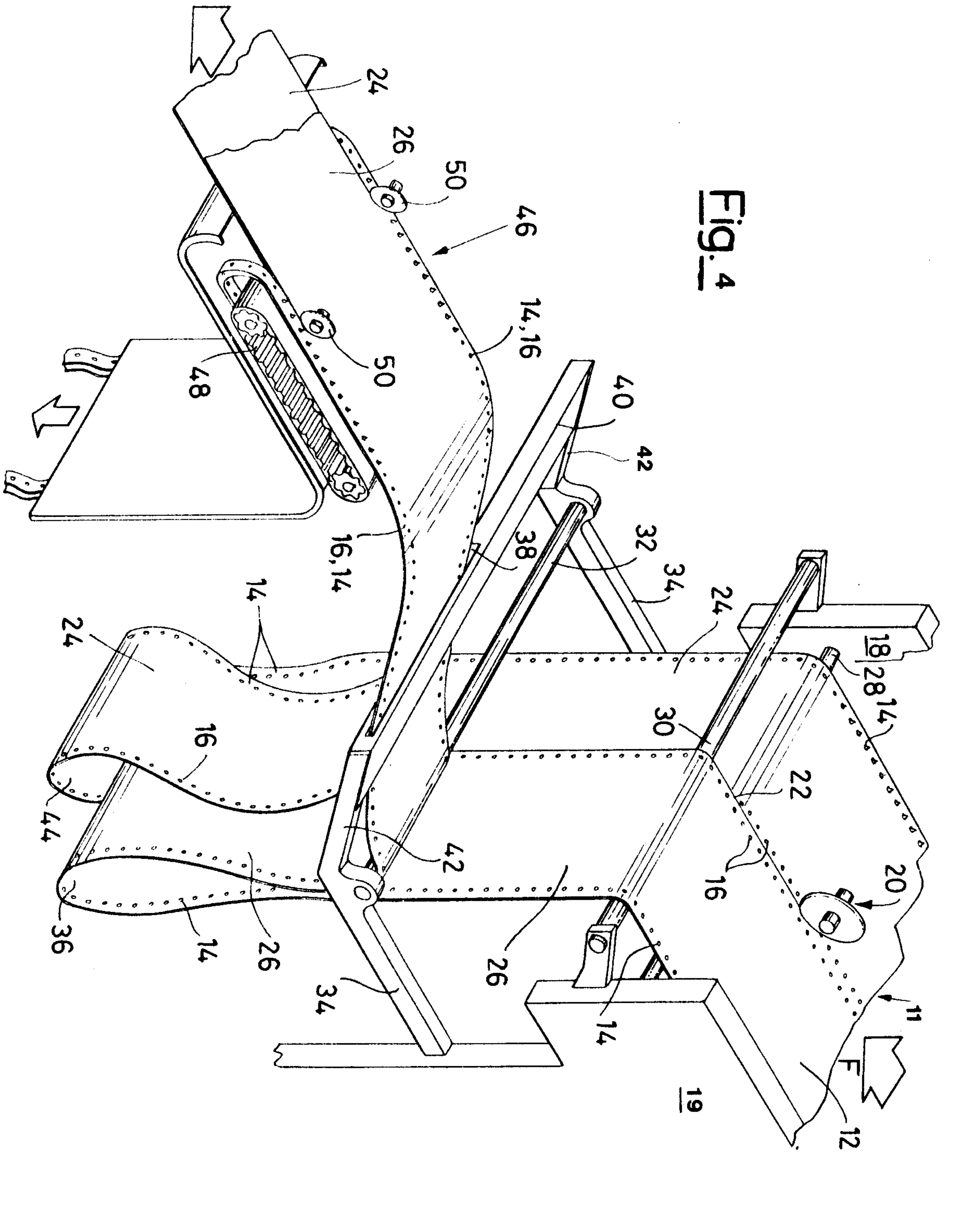
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Fig. 4

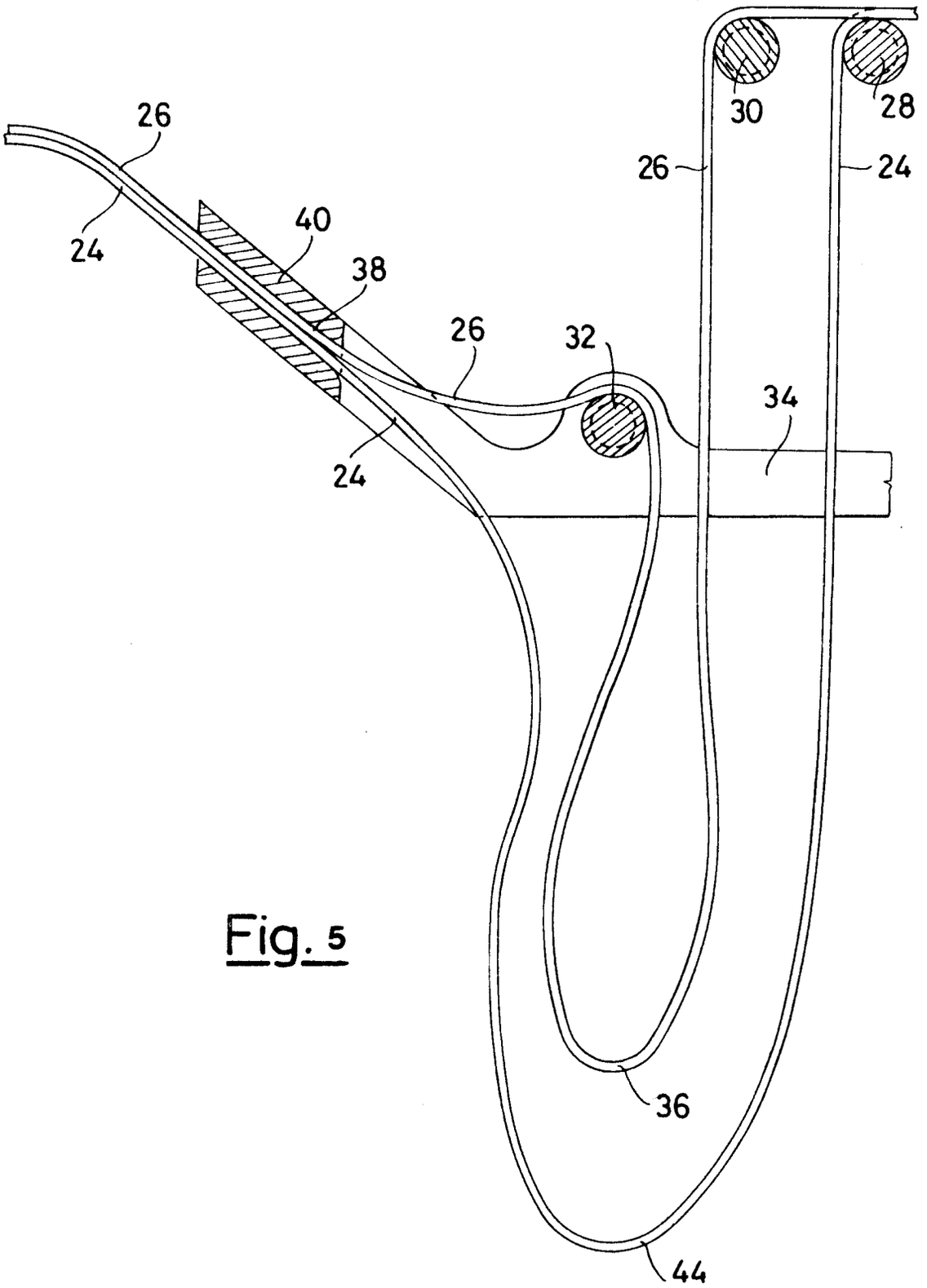

Fig. 5

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 20 0974

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	GB-A-1 546 798 (TIMSONS LIMITED) * the whole document *	1	B41L1/08 B65H35/02
X	FR-A-2 431 919 (MOORE BUSINESS FORMS) * page 3, line 40 - page 4, line 8; figure 3 *	1,2,3	
Y		4,5	
Y	US-A-3 039 345 (J. E. EUTH) * the whole document *	4,5	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B41L
B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	14 JULY 1992	MEULEMANS J.P.

CATEGORY OF CITED DOCUMENTS

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