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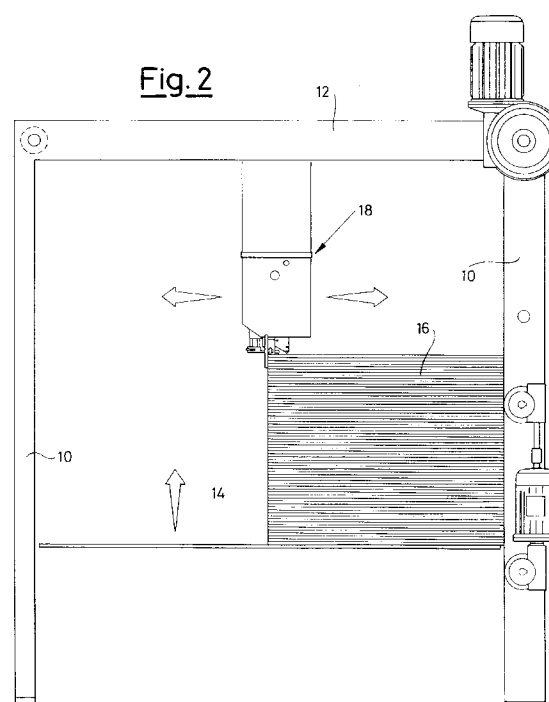
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(54) **Moving device for transferring sheets from a stack to a receiving or working plane.**

(57) For transferring single sheets from a stack (16) to a receiving or working plane (14a) a device is used provided with a series of suckers (48) transversally aligned with respect to the transfer direction of the sheets and connected to a vacuum source consisting of an ejector (182, figure 6) actuated by a compressed air source (170) with which the device is provided, such a series of suckers (48) being movable between two positions, lifted and dropped respectively on the top sheet (17) of the stack (16) of sheets to be transferred and being integral with a carriage or slider (50) movable in the direction of the sheet transfer against the opposing action of a return spring (162). The synchronisation of the different movements is provided by a plurality of cams (32, 34) mounted to a single cam shaft (30) rotated by a motor (20) timely actuated with the single steps of the operating cycle of the sheet placing device.



The present invention regards an improved sheet placing device useful for transferring materials in single sheets, stacked in packages, to a machine or device in which every sheet must undergo some processing. A specific example of this situation is given by the plastifying of magazine covers or other printed matter, in which the covers, coming from the print or other processing and stacked as rather thick packages thus containing a high number of single covers, must be separately fed to a plasticizing machine.

In the paper industry, and the like, since long time these sheet placing devices are used which substantially work by means of arms provided with end suckers: the arm is brought by a mechanical movement up to abut the suckers against the surface of the sheet to be grasped and transferred, while the suckers are connected with a pneumatic vacuum and, consequently, the suckers provide a grasping effect on the sheet.

In the meanwhile some blowing nozzles are actuated which emit air blows tangentially directed and cooperate to separated the sheet grasped by the suckers from the underlying sheets.

At this time the arm is again mechanically actuated and causes the suckers, and the sheet grasped by themselves to be advanced, to the inserting place in the downstream processing device.

These well known devices usually comprise motor means, for example a cardanic drive for moving the mechanic arm, provided with suckers, and a vacuum pump capable of producing the necessary vacuum for drawing and firmly grasping the sheet during the transfer.

With respect to these well know devices there are many problems and drawbacks which presently have not yet found a suitable and industrially advantageous solution.

Specifically:

a) The drawing of a single sheet without dragging of the underlying sheets is an essential condition for the proper operation of the upstream and downstream machines with respect to the sheet mover. Consequently, to assure that it can safely occur, the operating speed of the sheet placing device must be limited.

b) The vacuum pump highly contributes to the noise in the working room with consequent acoustic pollution. Further, as it is apparent, the simultaneous presence of a vacuum source and a compressed air source feeding the blowing nozzles raises the power cost of the processing.

c) The mechanical driving of the arm supporting the suckers by means of a cardanic mechanism is complex and prone to jammings and delays, ultimately affecting the production rate of the sheet placing mechanism and of the whole processing line.

d) In the presently used sheet placing devices

there are actually provided two different mechanisms, the first one providing to admit partially overlapped sheets, while the second one, thanks to the variability and control of the transfer speed, controls the overlap rate along an overlapping edge, increasing or reducing it according to the size of sheets to be worked, after the sheets are passed on an intake table. In such a way the linear dimensions and the size of the machine result highly increased with self-evident drawbacks.

It is a main purpose of the present invention to provide a sheet placing device in which the above briefly mentioned problems and drawbacks are substantially remedied in an industrially advantageous way.

Such a purpose is met by a sheet placing device for transferring single sheets drawn from a sheet stack to a processing plane, of the type comprising sucker means actuated by a first substantially horizontal alternate movement between a first raised position for the grasping of the sheet to be transferred and a second release position and by a second alternate movement between a raised or rest position and a lowered or engagement position of the related suckers with said sheet to be transferred; pressing foot means for engaging the sheet stack under the sheet to be transferred and actuated by a substantially vertical alternate movement between a raised or inactive position and a lowered or pressing position; nozzle means for providing compressed air blows tangentially directed with respect to the upper surface of the stack of sheets to be transferred and distributing means for feeding compressed air to said nozzle means, said placing device comprising ejector means driven by said compressed air distributing means and suitable to generate a desired vacuum in duct means connected with sucking means, a carriage or slider for said first alternative movement of said sucking means, cam means for the synchronized control of the operating movement of said pressing foot and of said carriage means for the respective movement between said operating and rest positions, as well as for controlling said distributing means for the cyclic feeding of both vacuum and compressed air to said sucking means and to said nozzle means and a plurality of mechanisms for transmitting the movements to the operating members of the sheet placing device.

As it will more clearly appear from the following detailed description, related to the enclosed drawings, the placing device according to the present invention provides several advantages, among which mainly:

1) A dedicated pump is no longer necessary, with consequent power saving, as well as elimination of a source of noise and acoustic pollution and of a mechanical member needing maintenance and repair.

2) Thanks to the use of suckers associated to

temporaneous sheet retaining means, the detachment of the upper sheet of the stack and the transfer thereof without troubling the underlying sheets is assured, with self-evident operating advantage.

3) The synchronization of the different mechanical members is obtained in a mechanically simple and safe way, with advantage of the operating reliability of the sheet placing device and the whole processing line.

In the enclosed drawings, showing in illustrative and not limiting way a preferred embodiment of the placing device according to the present invention:

Figure 1 is a front view of a machine for plasticizing covers including a placing device of the present invention;

Figure 2 is a side view of the same placing device; Figures 3, 4, 5 and 6 are views schematically showing the different operating positions of a sheet placing head with respect to different movements of the members of the placing device;

Figure 7 is a front and partial view obtained looking in the direction of the arrow VII of figure 3;

Figure 8 is a partial longitudinal cross section view along the line VIII-VIII of figure 3;

Figure 9 is a partial view depicting articulated joint systems allowing the movements of a carriage for transferring sheets according to the invention;

Figure 10 shows the lifting of sucker assemblies according to the invention and the consequent detachment of a sheet;

Figure 11 is a view having the purpose to depict the operations leading to obtain the translation of the carriage and the thereto associated suckers according to the desired path; and

Figure 12 is a fluidic schematic diagram showing the pneumatic assembly supplying and distributing both compressed air and vacuum to the members of the device needing them.

Referring at first to figures 1 and 2, the general structure of the device according to the present invention is depicted comprising a frame formed by four legs 10 connected by crosspieces 12.

To the legs 10, in a per se known way, a plane 14 is connected vertically movable in both directions by means of motor means; this plane is suited to receive a package 16 of sheets, arranged in a stack, to be singularly transferred to a downstream machine of the sheet placing device for a subsequent processing as for example the plastification in the case of covers for printed matters.

To the crosspieces 12 a sheet placing head is fastened indicated as a whole by the reference number 18; the head 18 can be moved with respect to the crosspieces 12 by using proper motor means, for both centering the head itself with respect to the sheet

stack for displacing the head operating members as to their position with respect to the sheet stack and thus with respect to each sheet to be transferred, for example when the format of the sheets to be transferred is changed.

The frame is also provided with usual means in the machines of this type means depicted in figure 2, which, being of traditional type are not described in more in detail.

The head 18 is provided with its motor 20, possibly associated to a ratomotor or, better, to a gearmotor having the purpose better herebelow explained. It means that the placing device according to the present invention is no longer using complex movement transmission mechanisms as occurred in the traditional devices.

Considering the figures 3 to 8, the head is depicted more in detail even if many details, not necessary for understanding the invention, have been omitted for a sake of clarity of the illustration.

The head 18 comprises two plate shoulders 22 and 24, to the shoulder 22 being fastened the ratomotor 20, with the shaft thereof housed in proper bearings 26 in the shoulders 22 and 24. The shoulders are rigidly joined and spaced from each other by rods 28 properly arranged so as not to interfere with the arrangement of other members but providing the structure with the necessary mechanical strength.

Now, referring more particularly to figures 7, 8 and 12, an actuator and air distributor assembly 30 is shown comprising the shaft 30, having the ends housed in said bearings 26 and keyed in a per se known way to the output shaft of the ratomotor 20. On the shaft 30 two cams are coaxially mounted respectively indicated by the reference numbers 32 and 34, for the herebelow described functions and a compressed air distributor, indicated as a whole by the numeral 36. The distributor 36 comprises a fixed cylindrical skirt 38 within of which a member 42 rotates, by means of bearings 40 being provided with peripheral suitably shaped slots, indicated by the numerals 44 (a, b, c and d), suitable to connect, at preset times of the operating cycle of the placing head and for preset time periods and depending from their circumferential extension, a compressed air source 170 with nozzles 46 (a_1 , a_2 , ..., d_1 , d_2) formed in the fixed skirt 38.

As will be herebelow disclosed more in detail, to the moving head 18 a plurality of sucker heads are fastened, indicated by the numerals 48 these heads being mounted, as will be also disclosed, to a carriage 50 movable between the two positions respectively depicted in the figures 3 to 6. In turn the sucker heads are movable between the two positions respectively depicted in the figures 3 and 4.

A head of the carriage 50 and of the sucker heads 48 with respect to the translation direction F of the sheets of the stack 16 a pressing foot assembly is pro-

vided comprising a true foot 52 fastened by means of a pin 54 in a sleeve portion 56 of an actuating arm 58, in order to permit the height setting of the foot 52 with respect to the stack 16 of sheets to be translated.

In the body of the foot a passage 60 is drilled, which is funnel-like open towards the tip of the foot 52 to give place to an expanding blow.

The passage 60 is connected to a duct 62, in turn connected to a compressed air supply, such as the compressed air distributor 36, particularly shown in the figures 7, 8 and 12.

The actuating arm 58, depicted more in detail in the figures 4, 5, 6 and 7, comprises a rod like body 64, provided with weight reducing apertures, ending at the upper end in a small triangular lever crank 66 bearing a roller or bearing 68 for the herebelow indicated purpose.

The other end of the lever crank 66, coinciding with the upper end of the arm 64, is pivoted (by means of the pin 69) to an end of a lever 70 having the other end in turn pivoted by means of a pin 72 and a spacer 74 to the adjacent shoulder 22 or 24 of the sheet placing head.

It is easily appreciated that in such a way the arm 64 is fastened to both shoulders 22 and 24 and thus enough balanced.

In an intermediate position the arm 64 is pivoted by means of the pin 76 to a first end of a second lever 78 the second end of which is pivoted by means of the pin 80 and the spacer 82 to the adjacent shoulder 22 or 24 in the same way as the lever 70.

Near the lower end or fastening end to the foot 52 the arm 64 is coupled to a crank 84, ending with a wedge or ramp profile 83, intended for acting on a roller or bearing 86, having the herebelow indicated purpose, and driven by a window bracket 85. The coupling with the arm 64 occurs by means of a slot 87 in the lower leg of the crank 84 and of a roller 89, fastened to the arm 64 itself, to allow only an alternating horizontal movement of the crank 84 without vertical components.

Looking now to the sucker bearing carriage 50, particularly detailed in figures 8 to 10, it comprises two sides 88 and 90 connected by rods, such as the rod 92, depicted in figure 8, and bearing at the lower end a bar 106, to which are in turn mounted the sucker heads 48, arranged in a row and three in number in the depicted embodiment. In turn, the bar 106 is fastened to the ends of arms 108, pivoted by pins 110 to the sides 88 and 90 of the carriage 50 and held in the position shown in figures 3, 7, 8 and 9 by torsion springs 111 acting between said arms 108 and pins 113 fastened to the sides 88 and 90.

Each sucker head 48 is of traditional type that is of the type commonly used in sheet transfer devices and the like, and consists of a cup portion 112 connected to a duct 184 for connection to a vacuum source which in the present case is an ejector 182 of

the type commonly found in the trade, the ejector 182 being in turn connected to the distributor 36 through a duct 180. It is to be noted that to the duct 184 is also connected a further duct 186 in communication too with the distributor 36 and having the task of admitting in the duct 184 compressed air for the purpose of releasing paper sheets, as it will be herebelow better pointed out.

The carriage 50 is provided at the lower end and behind the suckers in the direction of the arrow F, with a idle roller 114 having the purpose, herebelow pointed out, of cooperating to the detachment of a sheet 17, engaged by the suckers 48, from the subsequent sheet of the underlying stack 16.

For the movement of the carriage 50 between the two operating positions a mechanical pendulum assembly is provided, depicted in figure 11, capable, as it will seen of assuring an arc shaped lifting movement of the carriage followed by a horizontal rectilinear movement thereof.

For such a purpose a pair of lower pendula 116 and 118 is provided pivotally fastened to the adjacent shoulders 22 and 24 of the sheet placing head by means of respective pins and spacers 120 and 122. The upper ends of the lower pendula 116 and 118 are pivoted by means of pins 124 and bearings 126 to a pair of rockers 128 and 130, having their opposed ends also pivoted, by means of pins 132 and bearings 134, to corresponding upper pendula 136 and 138, which have their upper end pivoted to the adjacent shoulder, 22 and 24, respectively, by means of pins 140 and spacers 142.

The shoulders 88 and 90 of the sucker bearing carriage are pivotally fastened to the rockers 128 and 130, in a position nearer to the pivoting end of the rockers themselves to the lower pendula, by means of a pin 144.

This last one is provided with two bearings 146 slidably seated in slots in slots 148 provided in two arms of a fork 150 fastened to an end of a lever 152 serving for the operative displacement of the sucker bearing carriage and is pivoted at the lower end to a cross pin 154 having the ends pivotally housed in the two shoulders 22 and 24.

In an intermediate position the lever 152 is provided with an idle roll or bearing 158, which is engaged by the related actuating cam 34 and is nearby crossed by a hole 153 for anchoring return spring 160.

Both the lever 152 of the sucker bearing carriage 50 and the foot bearing arm 58 are provided with return springs 160 and 162, respectively, to return them in the starting conditions once an operating cycle is completed.

A complete understanding of the pneumatic system used in the device of the present invention is obtained by looking at figure 12. From said figure it is seen that a compressed air source, such as a compressor 170, is connected through a manifold 172 to

inlet connectors 46a₁, 46b₁, 46c₁ and 46d₁ of the distributor 36. Said distributor is provided with outlet connectors 46a₂, 46b₂, 46c₂ and 46d₂ which are connected, according to the respective order, to the duct 62 for the passage 60 of the foot 52, to the duct 180 feeding the ejector 182, to the duct 186 connected to the duct 184 outgoing from the ejector 182 and connected to the suckers 48, and to the duct 174 of the blowing nozzles 164.

Looking at the operation of the sheet placing device according to the present invention, it must, as the already known prior art devices, provide to pick-up the top sheet 17 of the stack 16 of single sheets to be transferred, for example, to a downstream processing plane 14a (Figure 5) and forming the entrance to the true plastifying section in the case of plastification of printed matter cover paying care not to move the underlying sheets, and to transfer the same through a preset space to the desired position.

Looking now at Figures 3 to 6, at the beginning of any operating cycle the device is in the condition and arrangement depicted in Figure 3.

In this condition the sucker bearing carriage 50 is in such a position that the sucker heads 48 engage the upper sheet 17 of the sheet stack 16 so that the distributor 36 is in such a position to connect the vacuum source 182 with each sucker head 48. In the meanwhile, the carriage 50 holds the idle roller 114 pressed against the stack 16 in order to prevent the vacuum of the suckers 48 from drawing sheets underlying the first sheet 17.

The compressed air source is connected through the air distributor 36 to the passage crossing the foot 52, as well as through a duct 174 to blowing nozzles 164 with which the lower portion of the sheet placing head is provided and which, as it will seen, operate at preset times of the operating cycle of the sheet placing head.

Coming back to consider the operating cycle with respect to the figure 3, the device has the foot 52 held in the raised lifted position by the engagement of the active profile of the cam 32 with the roller 68 which opposes the returning action of the spring 162 and the carriage 50 too in the retracted position due to the spring 160 actuating the lever 152.

The rotation of the shaft 30 sets the cam 32 in such a position to begin the raising stroke of the sucker heads 48, getting the condition of Figure 4 and during this lifting movement the vacuum in these heads is still operative, so that is made easier the detachment of the top sheet 17 of the stack 16 from the underlying ones also thank to cooperation of the compressed air fan shaped blow to come out from the front end of the foot 52.

This lifting movement of the sucker heads 48 is actually determined by the descending movement of the foot 52, in turn determined by the cam 32 along the profile of which runs the roller pin 68; actually the

downside translating movement of the foot 52 and the arm 64 to which is connected, thanks to the pivoting constraints of the arm itself provides a descending step according to a rear side inclined direction due to the minor height of the cam 32 and a step completing the descent and front side rotation until the foot 52 abuts against the top of the sheet stack 16 without however interfere with the sheet already grasped by the sucker heads 48, as the contemporaneous lifting movement of the sucker heads 48 has the consequence of subtracting this top sheet from the foot action.

In fact, the combined movement of the arm 64 gets the profile 83 of the crank 84 in touch with the roller 86, supported by fingers 109 fastened to the rod 106, so that said rod 106, bearing the sucker heads 48, rotates by means of arms 108 around the pin 110, coming to the arrangement of figure 10 as regards the sucker head bearing rod and to the condition of Figure 4, as regards the the whole sheet placing head.

In particular in the Figure 4 it is self-evident how the top sheet 17 is lifted from the underlying stack 16 without drawing any underlying sheets.

At the same time, in order to cooperate in detaching the rear edge of the top sheet 17 so as to follow the movement of the sucker heads 48 (whereby the top sheet gets for a while a curved arrangement with upside faced concavity also thanks to the cooperation of the roller 114) from the end nozzle 52, owing to the condition taken by the distributor 36, a compressed air jet comes out beginning at about half descending stroke of the foot 52 and then of the arm 64 and that, as it is easy to understand just thanks to the slightly inclined disposition of the foot, hits the underlying sheet stack at the area in which the rear edge of the upper sheet must separate from the underlying stack following the lifting movement of the sucker heads 48. In the Figure 4 the numeral 46a₁ indicates the inlet connector of the compressed air which, through the corresponding slot 44a and a second connector 46a₂ along the duct 62, depicted in said figure, is conveyed to the passage 60 of the foot 52.

The device is now in the condition depicted in Figure 4, so that the translation movement of the sheet can be started: the cam 34 engages the idle roller 158 on the arm 152 of the displacement lever of the sucker bearing carriage 50, whereby owing to the engagement of the slots 148 with the rollers or bearings 146, the pin 144 is front side drawn: the mechanics of this translation is clearly depicted in Figure 11 from which it is possible to readily appreciate how the displacement of the pin 144 follows a path which is slightly arcuated at the beginning whereas in the central and end portions becomes substantially rectilinear. Upon this translation of the carriage 50 with the relating sucker heads 48 is compelled, the sheet placing head is in the position depicted in Figure 5, in which also

occurs the release of the sheet displaced by the sucker heads during the translation of the carriage 50. It is to be noted that with the beginning of the translation movement of the carriage 50 the bar 106, bearing the sucker heads 48, takes again the normal condition, that is with the heads still arranged with their axis vertically disposed, as the engagement of the idle roller 86 with the profile 83 of the crank 84 ceases.

This release occurs through interruption of the connection of the sucker heads 48 with the vacuum source, that is the ejector 182, and actuation of the connection of the heads themselves with the compressed air source, thanks of course to the rotation of the shaft 30 and the positioning of the suitable slot 44c of the distributor 36 in order to connect the inlet connector 46c₁ to the outlet connector 46c₂, conveying compressed air to the duct 186 and then to the duct 184 and to the suckers 48 which, as a consequence, emit an air blow, as depicted in Figure 5.

At the same time the compressed air source is also connected with the lateral blowing nozzles 164 starting to release the new top sheet 17 of the stack 16 with an action similar to the so called "release" of paper sheet reams when they have to be loaded in any drawing and transferring device for single sheets. With the end of this step begins the return stroke coming back of the carriage 50 to the initial position depicted in Figure 6: for this purpose the rotation of the shaft 30 provides the disengagement of the cams 32 and 34 from the respective idle rollers 68 and 158, or at least the return back of the arm 64 and of the arm 152 in the initial position under the action of the respective return springs 162 and 160.

Is such a condition the sucker heads 48 are connected again with the vacuum source 182 and the heads themselves with the relating bar are lowered again to engage the upper sheet 17 of the stack 16 by grasping it, after which the already disclosed operating cycle is started again. From the above description it clearly appears that the device according to the present invention meets two substantial requirements, that is to certainly assure the transfer of just one sheet at a time to the receiving plane 14a, and to obtain that the operating sequence can be provided without encumbering mechanisms, by exploiting in the best possible way just one compressed air source.

Of course, there are possible and foreseeable variations conceptually and mechanically equivalent all to be meant as here covered.

Claims

1. Sheet placing device for transferring single sheets (17) from a sheet stack (16) on a first plane (14) to a receiving plane (14a) comprising sucker drawing means (48) characterized in that

said sucker means (48) are actuated along a first arcuated drawing movement for detaching the sheet (17) from the sheet stack (16) followed by an alternating substantially horizontal movement from said first plane (14) to the receiving plane (14a), the arcuated drawing movement of said sucker means (48) being accompanied by the pressure of an idle roller (114) on a point of the sheet (17) adjacent to the engagement point of said sucker means (48) and in that to said sucker means (48) a vacuum is applied while they are moved according to the first arcuated drawing movement, being said vacuum also applied during the substantially horizontal movement of the sucker means (48) for the transfer of the sheet (17) from the first plane (14) to the receiving plane (14a) and being then followed by air pressure application at the time of depositing the sheet (17) onto the receiving plane (14a).

2. Sheet placing device, as in claim 1, characterized in that just after the drawing sucker means (48) have engaged a single sheet (17) of the sheet stack (16), they are moved according to their arcuated displacement by a wedge or ramp profile (83) of crank means (84) associated to pressing foot means (52) engaging the sheet stack (16) under the sheet (17) to be transferred, moved by an alternating back and forth movement with respect to the sheet stack (16), said crank (84) moving arcuately said sucker means (48) when said pressing foot means (52) approach said sheet stack (16), said pressing foot means (52) having associated thereto an air passage (60) for producing an air blow tangentially lapping the top of the sheet stack (16) when said sucker means (48) raise the first sheet of the stack (16), cooperating to the detachment of said sheet from the stack, and being flanked by nozzle means (164) suited for blowing among the sheets of the stack (16) for causing a releasing effect thereof.
3. Sheet placing device, as in claim 2, characterized in that ejector means (182) fed by compressed air generating means (170) are used for generating a vacuum of desired rate in duct means (184) connected to said sucker means (48).
4. Sheet placing device, as in claims 1 to 3, characterized by a carriage or slide (50) for said first alternate movement of said sucker means (48), by motor means (20) for the actuation of said carriage (50) between the two said positions of horizontal displacement of said sucker means (48) and by cam means (32, 34) for the synchronized control of the several above mentioned members.

5. Sheet placing device, as in claim 4, characterized in that the pressing foot (52) is driven in the movements thereof by the cam (32) through an actuating arm (58) having at one end the pressing foot (52) itself and at the opposed end a finger (66) provided with an idle roller (68) engaging the same cam (32). 5

6. Sheet placing device, as in claim 5, characterized in that the actuating arm (58) is provided with a return spring (162) causing the roller (68) to remain in engagement against the cam (32). 10

7. Sheet placing device, as in claims 4 to 6, characterized in that said control cams (32, 34) are mounted on a single shaft (30), rotated by the motor means (20), also connected to a compressed air distributor (36) in the form of a rotary valve assuring the supply of compressed air in due time to the air passage (60) of the pressing foot (52), to the lateral nozzles (164) for releasing the sheet stack (16), of vacuum to the sucker means (48) through the ejector (182) and a duct (184) and of further blowing compressed air through a duct (186) to the sucker means (48) themselves. 15
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8. Sheet placing device, as in preceeding claims, characterized in that the carriage (50) is moved according to a first displacement along a raising arc and then according to another displacement substantially rectilinear and horizontal by an assembly of two double pendula, a lower one (116, 118) and an upper one (136, 138), articulated to each other and drive in movement by a lever (152) controlled by a cam (34) of the shaft (30). 30
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9. Sheet placing device, as in claim 8, characterized in that the lever (152) controls the assembly of double pendula (116, 118; 136, 138) through a fork (150) arranged at one end of the lever (152) itself, engages the cam (34) by means of an idle roller (158) at the opposed end of the lever (152) itself and maintains said roller (158) against said cam (34) through the action of a return spring (160). 40
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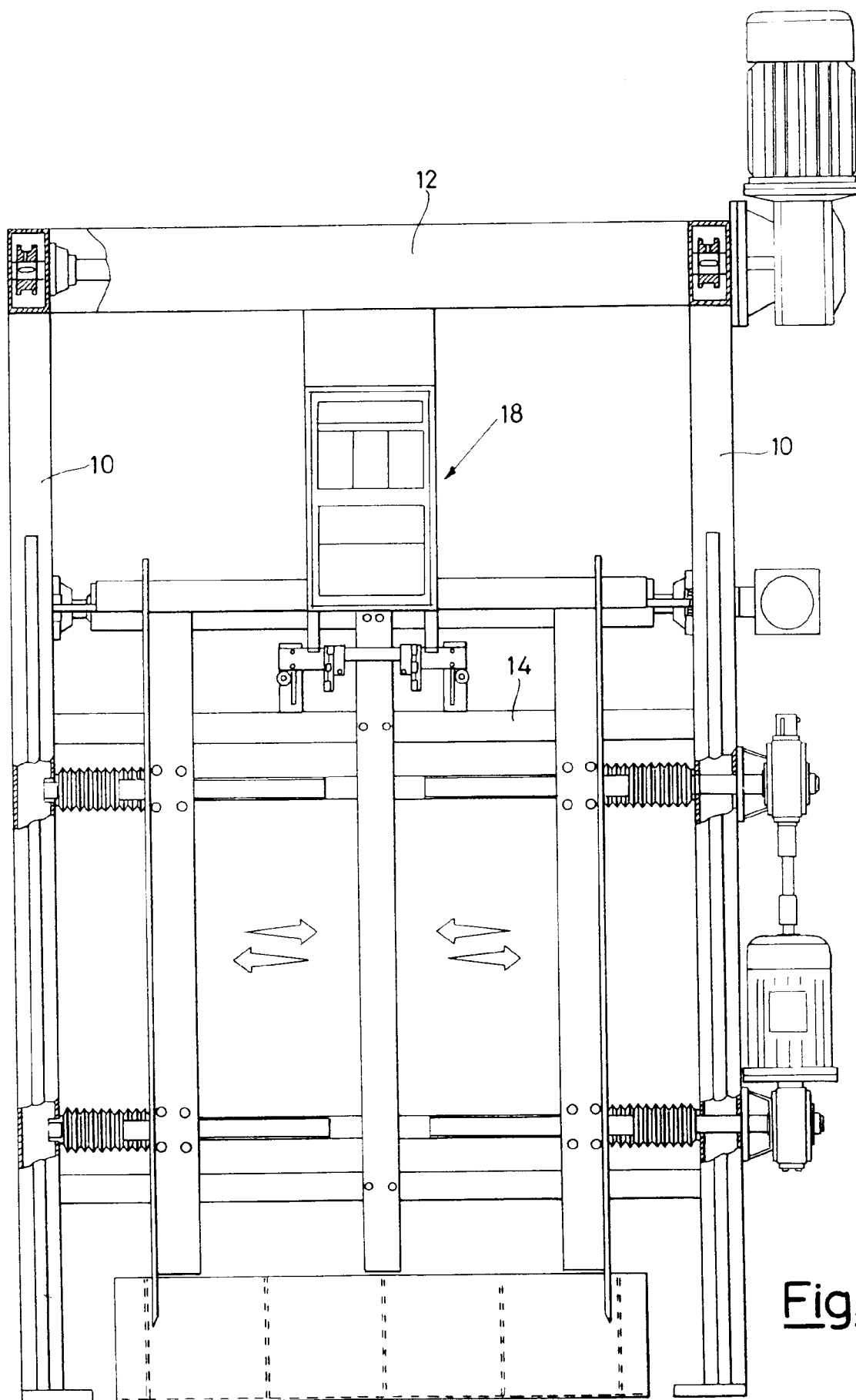


Fig.1

Fig. 2

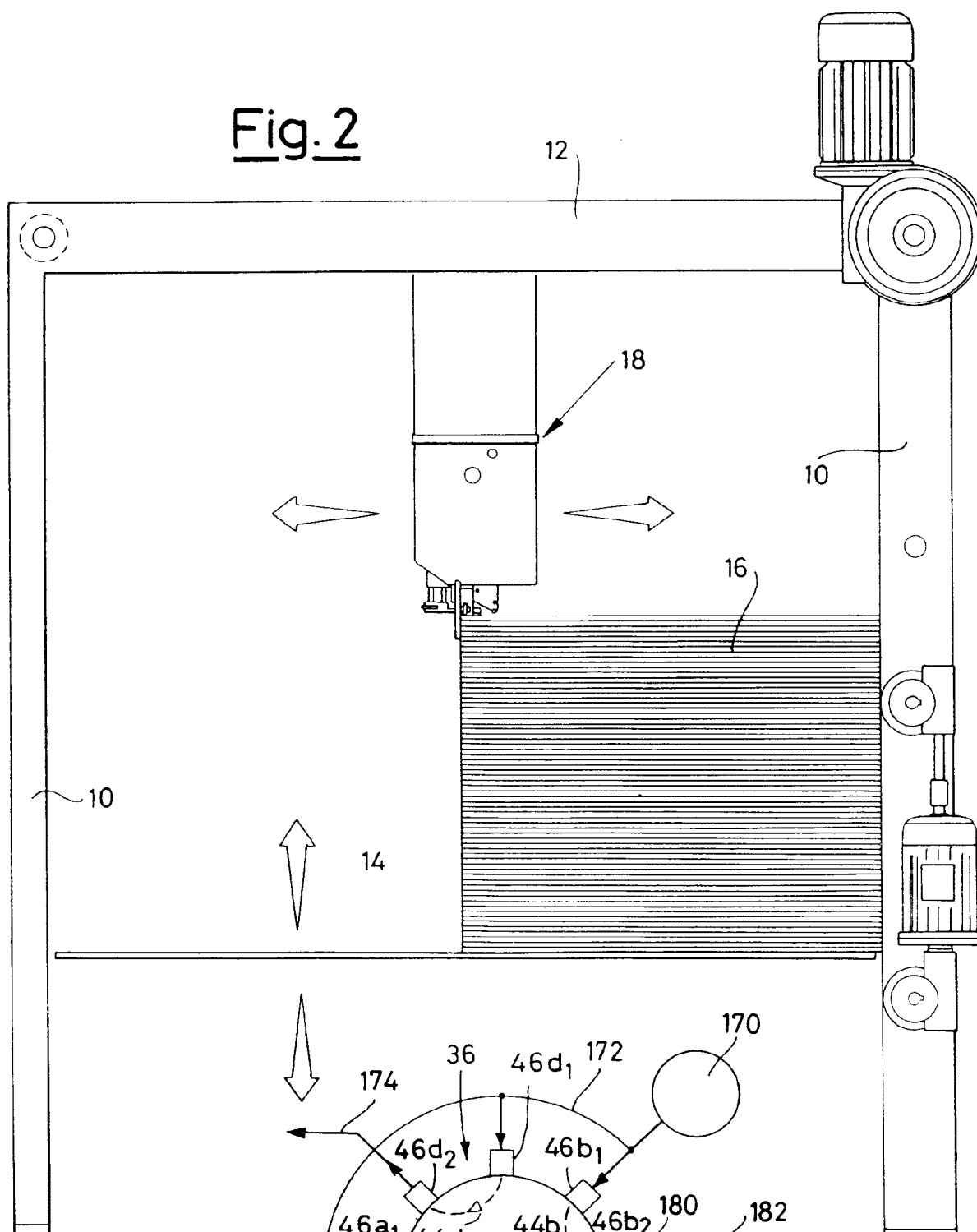
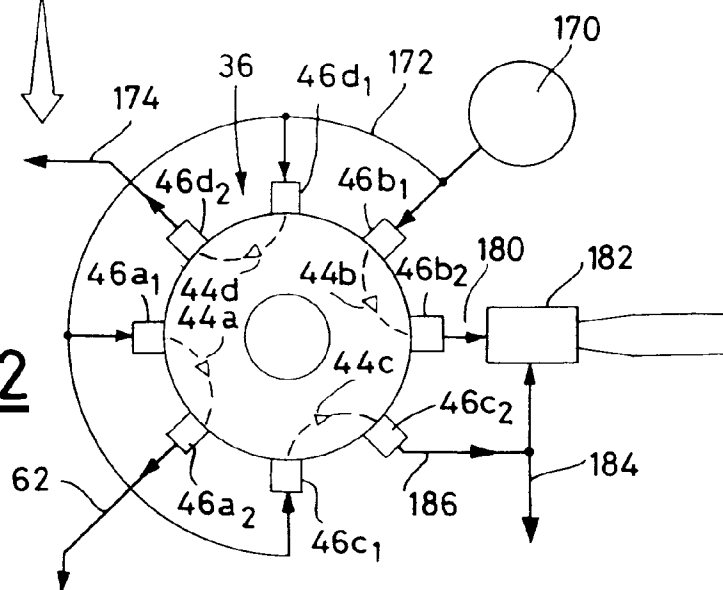


Fig.12



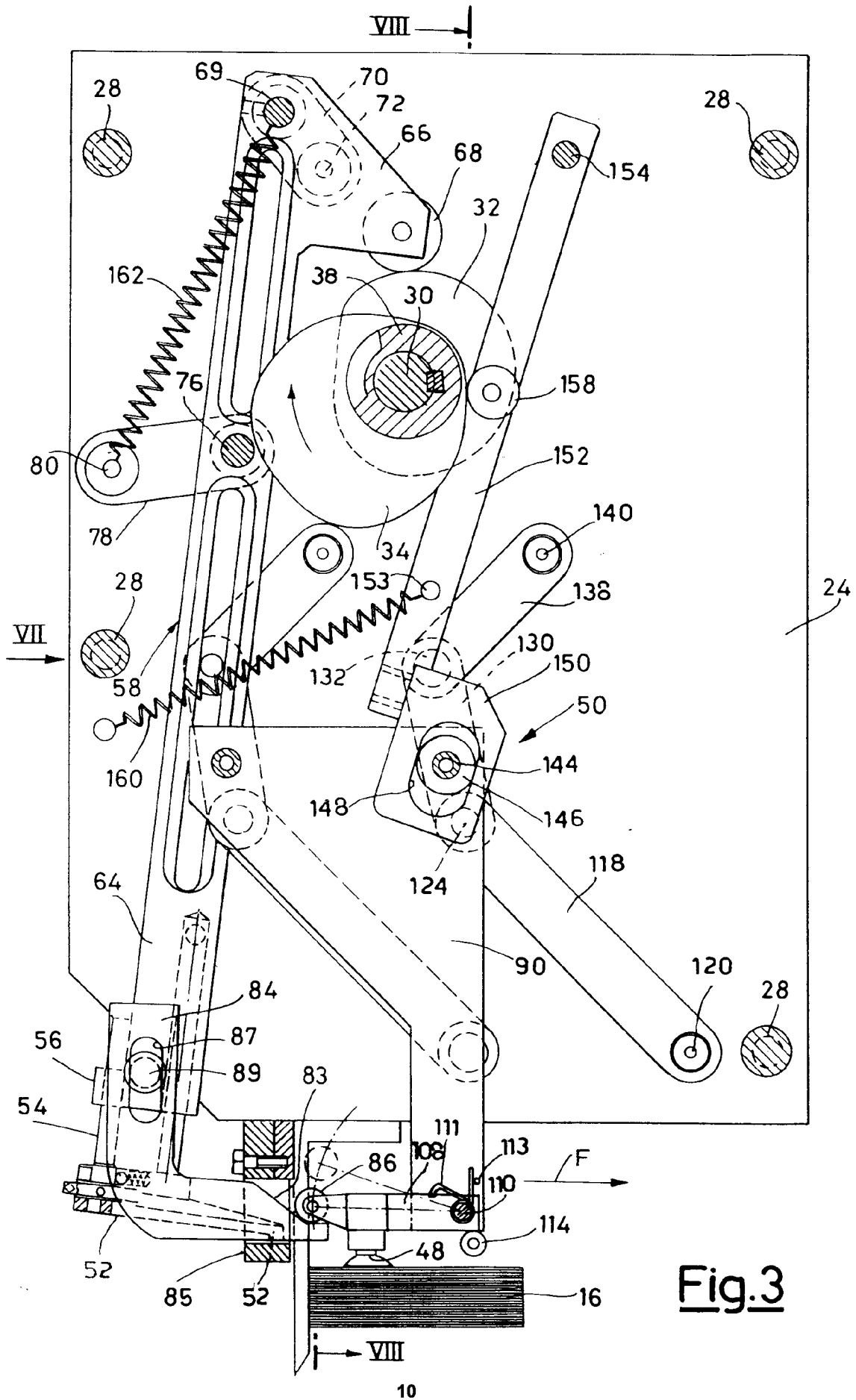


Fig.3

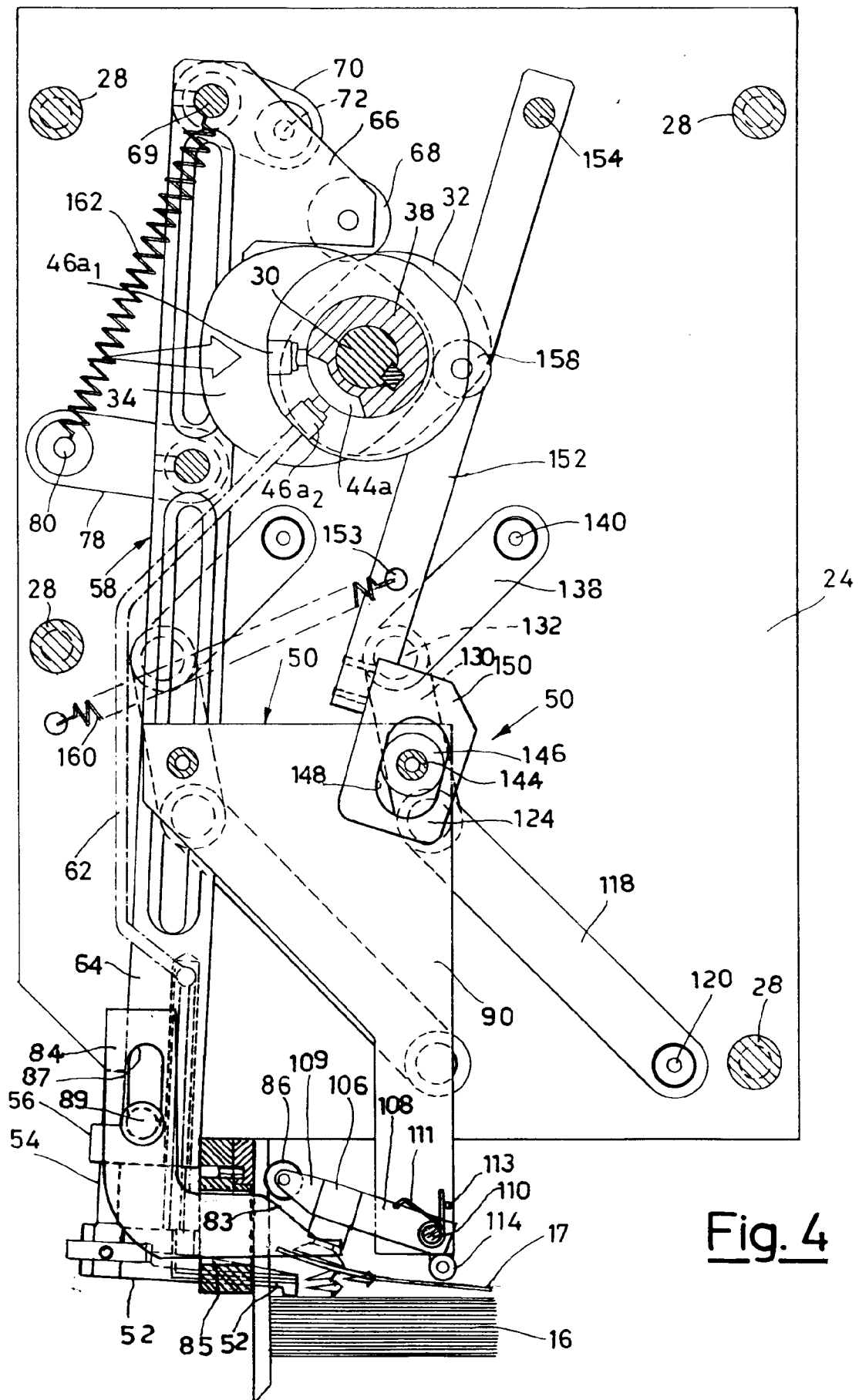


Fig. 4

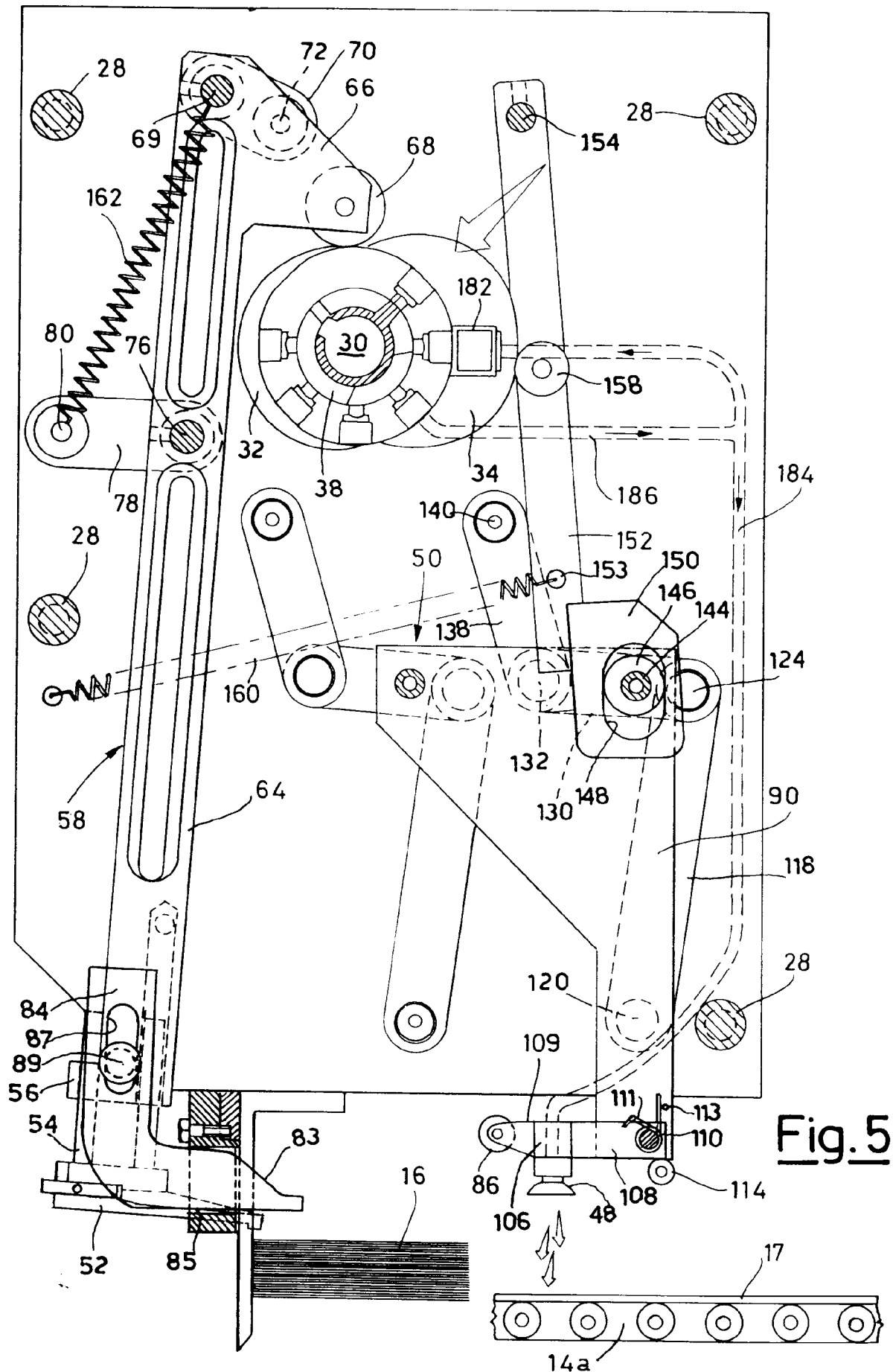


Fig. 5

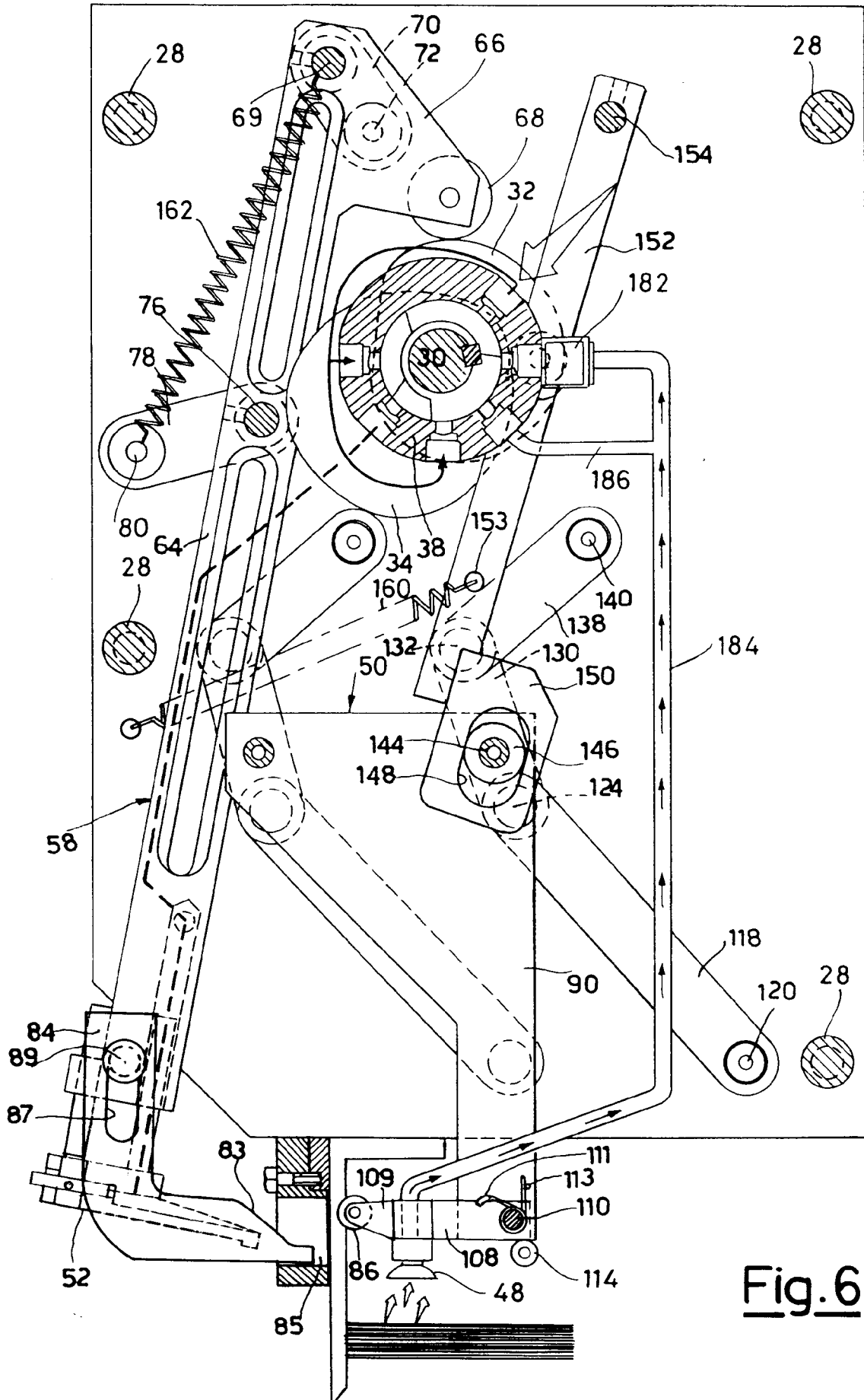
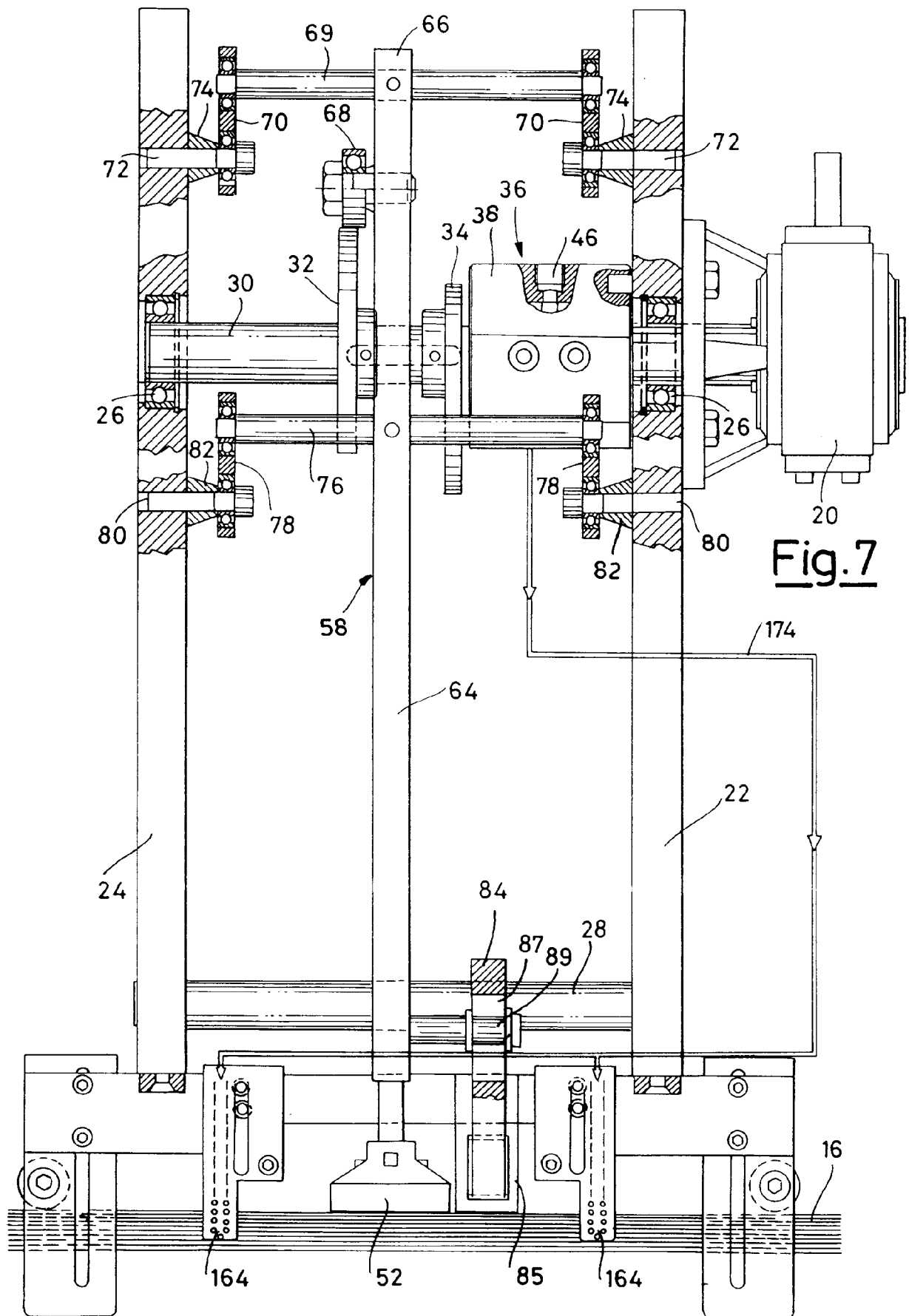


Fig. 6



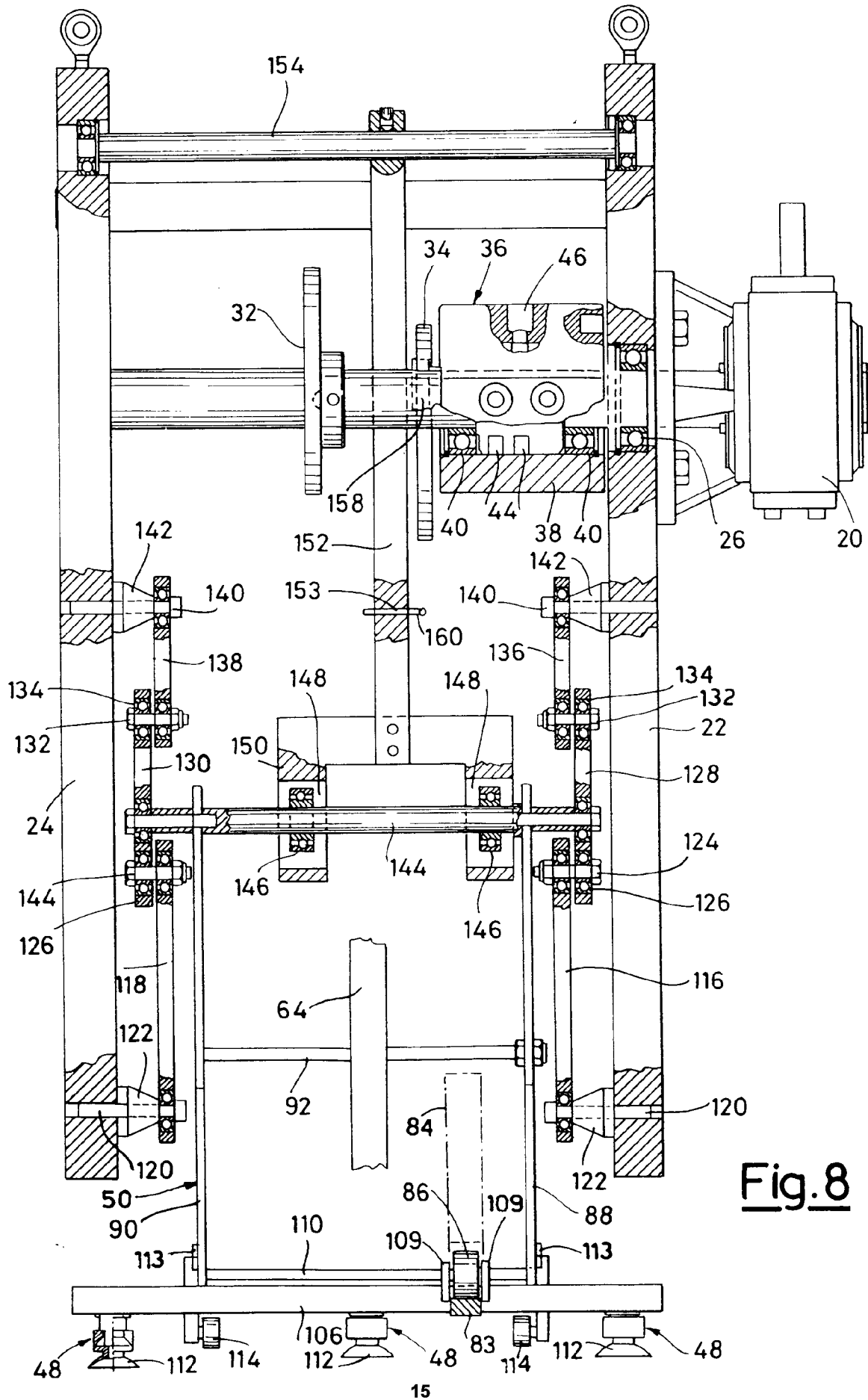


Fig. 8

Fig.11

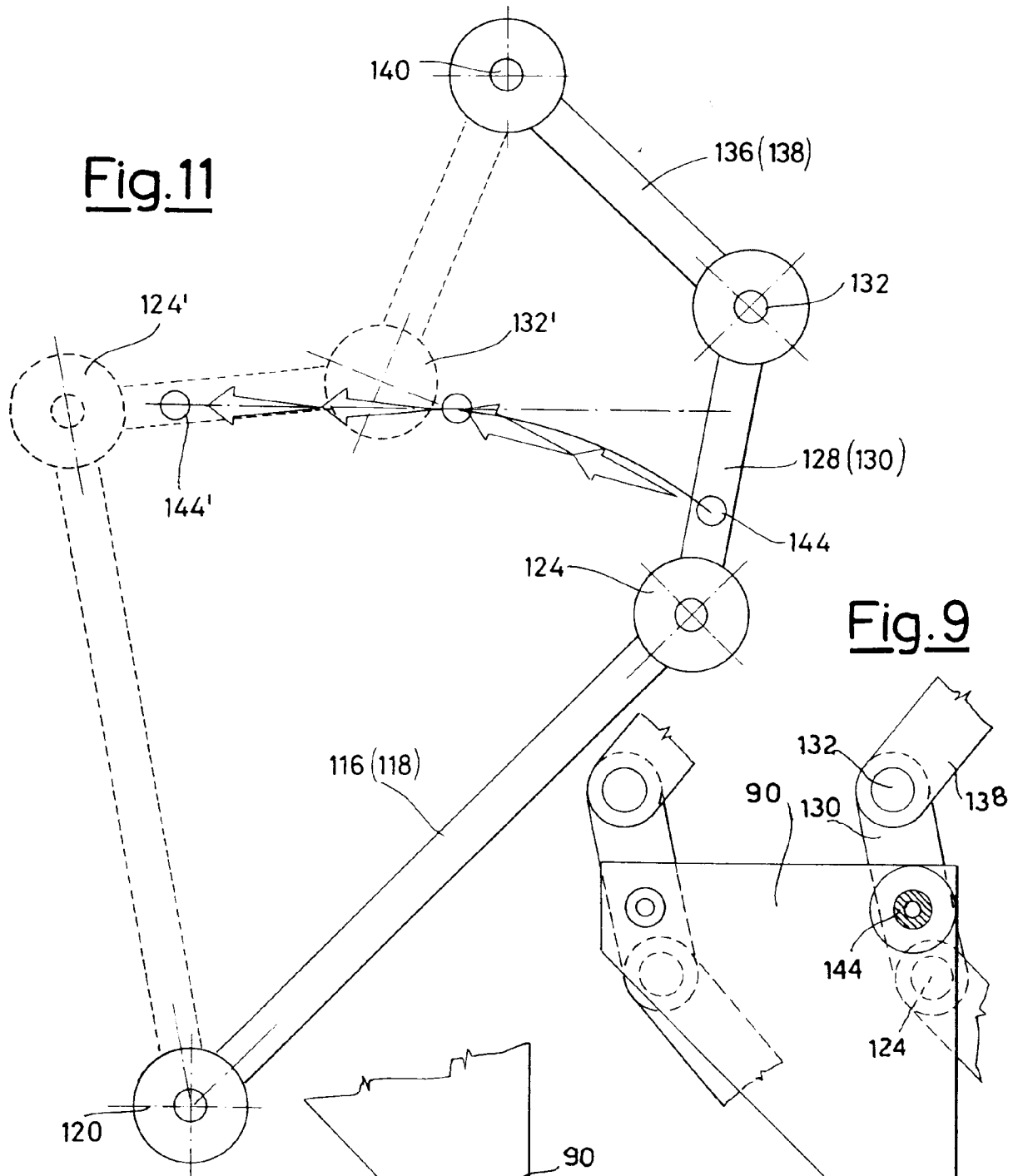


Fig.9

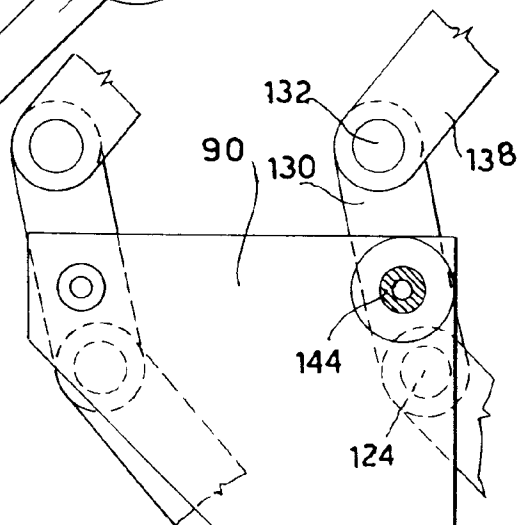
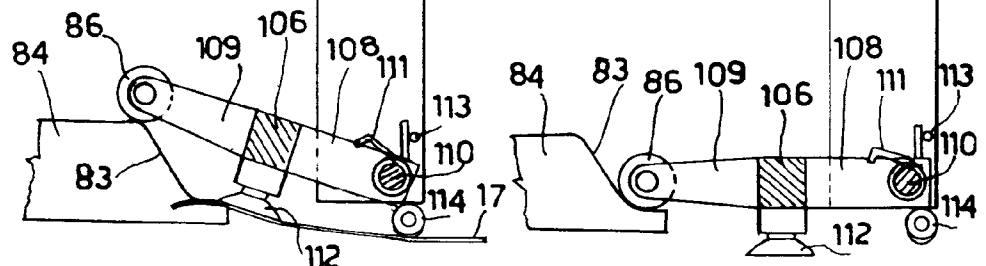


Fig.10





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 20 2433

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)
Y	FR-A-1 145 152 (BACKHOUSE) * the whole document * ---	1-9	B65H3/08
Y	DE-A-3 307 131 (SHARP) * page 8, line 5 - line 17; figures 4-7 * ---	1-9	
Y	FR-A-2 317 200 (VEB POLYGRAPH LEIPZIG KOMBINAT) * the whole document * ---	1-9	
Y	US-A-2 214 088 (F. W. SEYBOLD) * page 4, right column, line 16 - line 59; figures 10-13 * ---	2	
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A	DE-C-975 233 (GEORG SPIESS) * the whole document * ---	1-9	
A	US-A-2 869 867 (H. T. BACKHOUSE) * column 4, line 36 - column 8, line 66; figures * ---	1-9	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	US-A-2 085 612 (G. SPIESS) * page 1, right column, line 32 - page 3, right column, line 58; figures * ---	1-9	B65H
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A	US-A-1 920 388 (C. W. HARROLD) * the whole document * ---	1-9	
A	US-A-2 233 935 (H. T. BACKHOUSE\$) * the whole document * -----	1-9	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 11 DECEMBER 1992	Examiner MEULEMANS J.P.
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