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(54) **A SHEET NUDGING ASSEMBLY**

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(56) References cited:
EP-A- 0 645 328 WO-A-88/02735
US-A- 4 555 103 US-A- 5 163 666

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Description

[0001] The invention relates to a sheeting nudging assembly for use, for example, in a sheet handling system.

[0002] Sheet handling systems are used in a wide variety of fields to feed sheets from a stack. Examples include banknote dispensing and also photocopy paper dispensing. A known system for dispensing sheets from a stack is disclosed in EP-A-0645328. The assembly makes use of a rotatable wheel through which suction is applied selectively to draw sheets from the stack. The sheets are stacked on their edges in a sheet store, the store including a sheet exit and a face plate towards which the sheets are urged. Also provided are a sheet holding device, to selectively prevent sheets being fed, and a nudging device, to urge the foremost sheet towards the sheet exit. The nudging device engages with the leading sheet through an aperture in the face plate, the sheet is then nudged towards the sheet exit and the nudging device then retracts away from the sheet.

[0003] Generally the nudger eccentric is driven by the same drive that controls the valves for supplying vacuum to the components of the sheet handling system. Such an arrangement is disclosed in EP-A-0645328 and is used to maintain the timing of the nudging device relative to the sheet feed mechanism and the sheet holding device. However, this sometimes suffers from the disadvantage that when it is not required to feed a sheet, continued oscillation of the nudging device could cause the sheet to be advanced too much towards the sheet exit.

[0004] In accordance with the present invention, we provide a nudging assembly for nudging the leading sheet in a stack of sheets, the assembly comprising a nudging device coupled to a drive mechanism which causes the device to undergo a reciprocal movement; characterised in that the assembly further comprises a control mechanism for controllably activating the nudging device into an operative condition in which the device periodically engages the leading sheet in the stack of sheets and urges it towards a sheet exit, the control mechanism including a position controller for moving the nudging device between an extended operative position in which the device periodically engages the leading sheet in the stack of sheets and urges it towards a sheet exit and a retracted non-operative position in which it cannot engage the stack while allowing the device to continue with its reciprocal movement; and in that the nudging device comprises two sections, wherein the first section is coupled to the drive mechanism and the second section is movably mounted to the first section for movement between the retracted and extended positions.

[0005] The control mechanism may comprise means for controllably activating the nudging device drive mechanism whereby the device does not undergo the reciprocal movement when it is not required to feed a sheet or group of sheets.

[0006] Typically, the nudging device comprises part of a sheet handling assembly which further comprises a sheet holding device for holding the leading sheet in the stack of sheets. For example, the sheet holding device may comprise means for controllably applying a vacuum to the leading sheet in the stack of sheets.

[0007] In a first alternative, the mechanism that drives the nudging device and the mechanism that drives the valves that supply the vacuum to the components of the sheet handling system may be separate. It is then possible to stop the mechanism that drives the nudging device when it is not required to feed a sheet or group of sheets and restart the drive mechanism if sheets are to be fed. This can be done without interfering with the supply of vacuum to the remainder of the sheet handling system. That is, the nudging device is controlled independently from the sheet holding device.

[0008] In a second alternative, the activating means may controllably switch a single drive mechanism that drives both the valves and the nudging device. In this case, when it is not required to feed sheets the drive mechanism would be stopped and the motion of the nudging device and the control valves would cease, thus preventing sheets from being fed. Reactivation of the mechanism would once again lead to sheets being fed.

[0009] In the preferred embodiment, the nudging device continues to undergo reciprocal motion, but it no longer engages with the leading sheet of the stack of sheets. As a result, the foremost sheet is no longer urged toward the sheet exit. This helps prevent the unwanted feeding of sheets that sometimes occurred with the previous apparatus.

[0010] The advantage of providing the nudging device as two sections is that the section coupled to the drive mechanism and hence the drive mechanism itself, can remain stationary with respect to the stack of sheets. This allows for easier construction of the assembly.

[0011] Typically, the position controller comprises a fluid controlled piston cylinder arrangement, although any suitable means, such as a rack and pinion, could be used. As fluid controlled mechanisms are typically used elsewhere in the sheet handling system, it is easier to use a fluid controlled moving means than an alternative system.

[0012] Although it is possible to use any fluid in the piston cylinder arrangement, typically air is used. This has the advantage that it is readily available and that sources of compressed air are already used in the sheet handling system.

[0013] In general, the nudging assembly would be associated with a control means for controlling whether the device is positioned in its extended or retracted position. Where the position controller comprises a piston cylinder arrangement, the control mechanism controls the supply of fluid to the position controller. It may be possible to use a continuous fluid supply and control the pressure in the cylinder using a valve, although the control of the fluid supply is preferred as any valves are then

located separate from the device. This makes general maintenance and repair work easier to carry out.

[0014] Preferably, the first section of the nudging device defines a cylinder whilst the second section defines a piston positioned within the cylinder. Although the reverse case is possible, the preferred system has the advantage that the cylinder will remain stationary with respect to the stack of sheets and the remainder of the assembly. As it is required that the fluid source is coupled to the cylinder, the assembly is more easily achieved if the cylinder does not retract and extend.

[0015] Generally, the nudging device also includes a means for normally urging the device into the retracted position. This is preferable to urging the device into the extended position in that should a fault occur with the system, the nudging device will generally retract and hence stop urging sheets toward the sheet exit. This helps prevent unwanted feeding of sheets.

[0016] The urging means is typically a compression spring but an extension spring or similar means could be used.

[0017] As previously mentioned, the nudging assembly can be used in a sheet handling system. Such systems can be utilized with various different types of sheets including banknotes and other paper, card and the like.

[0018] An example of a nudging assembly and a sheet handling system according to the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a cross-section through the nudging device of the preferred embodiment;

Figure 2 is a plan view of the nudging device shown in Figure 1;

Figure 3 is an end view of section one of the nudging device shown in figure 1;

Figure 4 is a diagram of the sheet handling assembly, partly in plan and partly schematic;

Figure 5 is an end view of the face plate through which the nudging device projects;

Figure 6 is a perspective view of the component parts of the nudging device shown in Figure 1;

Figure 7 is a perspective view of the components of the piston arrangement; and,

Figure 8 is a perspective view of the assembled nudging device of the preferred embodiment connected to a control means shown in schematic form.

[0019] The nudging device shown in the drawings comprises a first section 1 and a second section 2. The first section 1 is formed from a support block 3 which defines a cylinder 4. The cylinder 4 is connected to a source of air pressure via an inlet 5. As shown in Figures 6 and 8, the inlet 5 is connected to an air supply 51 via a spigot 56, right angle tube 57, nut 58, an air hose or tubing 64 and a solenoid controlled valve 52. In addition, washers 59,60,61 are provided to ensure the assembly

remains air tight. As shown in Figure 8, the solenoid operated control valve 52 is controlled by a controller 62.

[0020] The drive mechanism for the support block 3 includes a shaft 6 having screwed into it an eccentrically positioned bolt 7. The bolt 7 extends through bearings 8 which are mounted in a bore 9. Movement of the support block 3 in response to rotation of the shaft 6 is constrained to be along an elliptical path by means of a pivot pin 10 supporting a yoke 11. The pin and yoke are shown more clearly in Figure 2. The yoke 11 is positioned and constrained to move between blocks 12 and 13 which are mounted on block 3 by bolts 14.

[0021] The second section 2 is formed from a metal block 15 having a U-shape so as to define arms 16 and 17 (Figure 6). Rubber ends 18 and 19 are bonded to arms 16 and 17 respectively. Block 15 is connected to an actuating rod 20, which has a shaped end piece 21, via bolt 22. The actuating rod 20 forms part of a piston assembly and is mounted inside the cylinder 4.

[0022] The piston assembly comprises a compression spring 23, a piston 24, a seal 25, and nuts 26. The components of the piston assembly are mounted on the actuating rod 20 as shown in Figure 7. The piston assembly is held in cylinder 4 by a sealing piece 27, which in turn is held in place by bolts 27a and 27b. The positioning of these bolts is shown in Figure 3.

[0023] To provide additional support for section 2, a guide piece 28 is provided. This is mounted on support block 3 by a bolt 29. The guide piece 28 engages with slot 30 defined by the nudging block 15 as shown in Figure 2.

[0024] Extension of the nudging device is achieved by supplying air under pressure through the inlet 5 to the cylinder 4. The increase in pressure in the cylinder 4 causes the piston to move outwards thus compressing the spring 23. As the piston 24 is fixed to the rod 21 this also moves, and as a result the second section 2 moves away from the first section 1, increasing the overall length of the nudging device.

[0025] Figure 4 shows the nudging assembly in use in a sheet handling system. The sheet handling system comprises a face plate 31 and an end wall 35 on adjacent sides of a base 33. The sheet handling system also includes a sheet feed device 36 and a sheet holding device 37. The sheet feed device 36 comprises a peeler wheel 38, a pinch roller 39 and a contra roller 40, which are positioned adjacent to a sheet exit 41. The sheet holding device 37 comprises a manifold 42 connected to the face plate 31 by pins 43 and urged against the plate 31 by compression springs 44. Air or vacuum is supplied to bore 45 in manifold 42 from which it passes through a conduit 46 to an outlet 47 for communication with sheet 32 through apertures 53 in the face plate 31. These apertures are shown in Figure 5. Operation of such a sheet handling system is described in more detail in EP-A-0645328.

[0026] Further features of the sheet handling system include a rear wall 48 which supports a motor 49 con-

nected via a follower block 50 to a guide wall 34. Upon activation of the motor 49, the guide wall 34 vibrates to aid sheet feeding. The guide wall 34 and the end wall 35 have shaped end pieces 36 and 37' respectively, these end pieces being shaped towards the sheet exit 41 to further aid sheet feeding. The ends 18 and 19 of the nudging device project through apertures 54 and 55 respectively.

[0027] Operation of the sheet handling system will now be described.

[0028] When in use, a stack of sheets is placed upon the base 33 between the guide wall 34 and the end wall 35. These sheets are urged towards the face plate 31 by an urging means, not shown, such as a sprung loaded plate. If operating correctly, the controller 62 will respond to signals on a line 63 from the sheet handling mechanism to cause a vacuum to be supplied to the bore 45 from a vacuum source (not shown). This communicates with the sheets 32 via apertures 53 in the face plate 31 (Figure 5). This sucks the leading sheet onto the face plate 31. The controller 62 also actuates the valve 52 so that air pressure is supplied from the pump 51 to the nudging device, causing the device to extend in length as previously described. As the shaft 7 rotates the rubber ends 18 and 19 of the nudging device will undergo reciprocating motion as indicated by arrow 53. During this motion the rubber ends 18 and 19 project through the apertures 54,55 in the face plate 31 and engage with the leading sheet 32, this situation being shown in Figure 1. As the arms move from right to left (the feed direction), according to Figure 4, air pressure is supplied to the bore 45 and vacuum is supplied to the peeler wheel 38 using a system as illustrated in Figure 1 of EP-A-0645328. This causes the leading sheet in the stack to be released from the face plate 31. The nudging device nudges the sheet towards the sheet exit 41, where it is sucked on to the peeler wheel 38. As the peeler wheel rotates, the sheet is removed from the assembly through the sheet exit 41. As the arms of the nudging device begin to retract, due to the reciprocal motion, the vacuum is once again applied to bore 45. This attracts the next sheet to face plate 31. By the time the first sheet has been removed through the sheet exit 41, the arms of the nudging device are fully retracted behind the face plate 31, they then return to their initial position and the cycle begins again. The vacuum applied through the apertures 53 and counter rotation of the roller 40 prevent more than one sheet being fed at the same time.

[0029] If feeding of the notes is to be stopped, or should any fault occur with the mechanism, such as a note becoming permanently stuck to the peeler wheel or the sheet exit 41 becoming blocked, then the control valve 52 is controlled by the controller 62 to stop the supply of air from the supply 51 to the nudging device. As a result the nudging device retracts in length under the influence of the spring 23 and, although it is still undergoing reciprocating motion, the ends 18 and 19 no

longer project through the face plate 31 and cannot engage with the leading sheet of the stack. This situation is shown in Figure 2. With the nudging means no longer engaging sheets, the leading sheet will not be urged towards the sheet exit 41 and feeding of the sheet will cease. When the blockage in the feed mechanism is removed, the valve 52 will again be operated to supply air to the nudging device and feeding of sheets will once again commence.

Claims

1. A nudging assembly for nudging the leading sheet in a stack of sheets, the assembly comprising a nudging device coupled to a drive mechanism which causes the device to undergo a reciprocal movement, characterised in that the assembly further comprises a control mechanism for controllably activating the nudging device into an operative condition in which the device periodically engages the leading sheet in the stack of sheets and urges it towards a sheet exit, the control mechanism including a position controller for moving the nudging device between an extended operative position in which the device periodically engages the leading sheet in the stack of sheets and urges it towards a sheet exit and a retracted non-operative position in which it cannot engage the stack while allowing the device to continue with its reciprocal movement; and in that the nudging device comprises two sections, wherein the first section is coupled to the drive mechanism and the second section is movably mounted to the first section for movement between the retracted and extended positions.
2. A nudging assembly according to claim 1, wherein the position controller comprises a fluid controlled piston cylinder arrangement.
3. A nudging assembly according to claim 2, wherein the fluid is air.
4. A nudging assembly according to claim 2 or claim 3, wherein the first section of the nudging device defines a cylinder and the second section of the nudging device defines a piston that is positioned within the cylinder.
5. A nudging assembly according to any of claims 2 to 4, wherein the control mechanism includes means for controlling the supply of fluid to the piston cylinder arrangement.
6. A nudging assembly according to any of the preceding claims, wherein the nudging device further comprises means for normally urging the device into the retracted position.

7. A nudging assembly according to claim 6, wherein the means for normally urging the device into a retracted position comprises a compression spring.
8. A nudging assembly according to any of the preceding claims, wherein the control mechanism comprises means for controllably activating the nudging device drive mechanism. 5
9. A sheet handling assembly comprising a sheet store for holding a stack of sheets; a sheet exit towards which individual sheets are urged from the stack of sheets; a sheet feed device for carrying individual sheets away from the sheet exit; and a nudging assembly according to any of the preceding claims for urging the sheets from the stack towards the sheet exit. 10
10. A sheet handling assembly according to claim 9, when dependant on any of claims 2 to 7, the sheet store including a face plate against which sheets in the stack are urged, the face plate having one or more apertures through which the nudging device can protrude, wherein the control mechanism causes the nudging device to retract through the aperture(s) when the sheet feed device is not to feed sheets and to extend through the aperture(s) when the sheet feed device is to feed sheets. 15
11. A sheet handling assembly according to claim 9 or claim 10, comprising a sheet holding device for holding the leading sheet in the stack of sheets, and wherein the sheet holding device is driven and controlled independently from the nudging assembly. 20
12. A sheet feeding assembly according to claim 11, wherein the sheet holding device comprises means for selectively applying a vacuum to the leading sheet in the stack of sheets. 25

Patentansprüche

1. Anstupsereinrichtung zum Anstupsen des vordersten Blattes in einem Bogenstapel, mit einer Anstupsvorrichtung, die mit einem Antriebsmechanismus verbunden ist, der eine Hin- und Herbewegung der Vorrichtung bewirkt, dadurch gekennzeichnet, daß die Einrichtung ferner einen Steuermechanismus zur gesteuerten Aktivierung eines Betriebszustands der Anstupsvorrichtung aufweist, in dem die Vorrichtung periodisch mit dem vordersten Bogen des Bogenstapels zur Anlage kommt und ihn zum Bogenausgang drückt, wobei der Steuermechanismus eine Lagesteuerung zum Verschieben der Anstupsvorrichtung zwischen einer vorgeschobenen Betriebslage, in der die Vorrichtung am vordersten Bogen des Bogenstapels anliegt und ihn zum Bo-

genausgang drückt, und einer zurückgezogenen Außerbetriebslage, in der sie nicht mit dem Stapel zur Anlage kommen kann, es der Vorrichtung jedoch weiterhin möglich ist, ihre Hin- und Herbewegung fortzusetzen, aufweist; und daß die Anstupsvorrichtung zwei Abschnitte aufweist, von denen der erste Abschnitt mit dem Antriebsmechanismus und der zweite Abschnitt am ersten Abschnitt beweglich angebracht ist, so daß er zwischen der zurückgezogenen und der vorgeschobenen Lage bewegbar ist.

2. Anstupsereinrichtung nach Anspruch 1, bei der die Lagesteuerung eine fluidgesteuerte Kolben-Zylinder-Anordnung aufweist. 15
3. Anstupsereinrichtung nach Anspruch 2, bei der das Fluid Luft ist.
4. Anstupsereinrichtung nach Anspruch 2 oder Anspruch 3, bei der der erste Abschnitt der Anstupsvorrichtung einen Zylinder und der zweite Abschnitt einen Kolben bildet, der in dem Zylinder angeordnet ist. 20
5. Anstupsereinrichtung nach einem der Ansprüche 2 bis 4, bei der der Steuermechanismus ein Mittel zum Steuern der Zufuhr des Fluids zur Kolben-Zylinder-Anordnung aufweist. 25
6. Anstupsereinrichtung nach einem der vorhergehenden Ansprüche, bei der die Anstupsvorrichtung ferner ein Mittel aufweist, das die Vorrichtung normalerweise in die zurückgezogene Lage drückt. 30
7. Anstupsereinrichtung nach Anspruch 6, bei der das die Anstupsvorrichtung normalerweise in die zurückgezogene Lage drückende Mittel eine Druckfeder aufweist. 35
8. Anstupsereinrichtung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß der Steuermechanismus ein Mittel zur steuerbaren Aktivierung des Anstupsvorrichtungs-Antriebsmechanismus aufweist. 40
9. Bogenhandhabungseinrichtung mit einem Bogen-speicher zum Halten eines Bogenstapels; einem Bogenausgang, zu dem einzelne Bögen vom Bogenstapel weggedrückt werden; eine Bogenvorschubvorrichtung zur Wegbeförderung einzelner Bögen vom Bogenausgang und eine Anstupsereinrichtung nach einem der vorhergehenden Ansprüche zum Wegdrücken der Bögen vom Stapel zum Bogenausgang. 45
10. Bogenhandhabungseinrichtung nach Anspruch 9, zurückbezogen auf einen der Ansprüche 2 bis 7, bei

der der Bogenspeicher eine Anlageplatte aufweist, gegen die Bögen im Stapel gedrückt werden, wobei die Anlageplatte eine oder mehrere Öffnungen aufweist, durch die die Anstupsvorrichtung hindurchragen kann, wobei der Steuermechanismus bewirkt, daß die Anstupsvorrichtung durch die Öffnung(en) zurückgezogen wird, wenn die Bogenvorschubvorrichtung keine Bögen vorschieben soll, und durch die Öffnung (en) hindurchragt, wenn die Bogenvorschubvorrichtung Bögen vorschieben soll.

11. Bogenhandhabungseinrichtung nach Anspruch 9 oder Anspruch 10, mit einer Bogenhaltevorrichtung zum Festhalten des vordersten Bogens im Bogenstapel und bei der die Bogenhaltevorrichtung unabhängig von der Anstupsanordnung angetrieben und gesteuert wird.

12. Bogenhandhabungseinrichtung nach Anspruch 11, bei der die Bogenhaltevorrichtung ein Mittel zum wählbaren Anlegen eines Unterdrucks an den vordersten Bogen im Bogenstapel aufweist.

Revendications

1. Ensemble de poussée par à-coups destiné à pousser par à-coups la feuille avant dans une pile de feuilles, l'ensemble comportant un dispositif de poussée par à-coups relié à un mécanisme d'entraînement qui amène le dispositif à subir un mouvement alternatif; caractérisé en ce que l'ensemble comprend en outre un mécanisme de commande destiné à activer de manière pouvant être commandé le dispositif de poussée par à-coups dans une condition active dans laquelle le dispositif engage de manière périodique la feuille avant dans la pile de feuilles et la pousse vers une sortie de feuilles, le mécanisme de commande comprenant un dispositif de commande de position destiné à déplacer le dispositif de poussée par à-coups entre une position active sortie dans laquelle le dispositif engage de manière périodique la feuille avant dans la pile de feuilles et la pousse vers une sortie de feuilles et une position inactive rétractée dans laquelle il ne peut engager la pile tout en permettant au dispositif de poursuivre son mouvement alternatif; et en ce que le dispositif de poussée par à-coups comprend deux sections, la première section étant reliée au mécanisme d'entraînement et la deuxième section étant montée de façon mobile sur la première section pour un déplacement entre les positions rétractée et sortie.
2. Ensemble de poussée par à-coups selon la revendication 1, dans lequel le dispositif de commande de position comporte un agencement piston-cylindre commandé par fluide.

dre commandé par fluide.

3. Ensemble de poussée par à-coups selon la revendication 2, dans lequel le fluide est de l'air.
4. Ensemble de poussée par à-coups selon la revendication 2 ou la revendication 3, dans la première section du dispositif de poussée par à-coups définit un cylindre et la deuxième section du dispositif de poussée par à-coups définit un piston qui est positionné à l'intérieur du cylindre.
5. Ensemble de poussée par à-coups selon l'une quelconque des revendications 2 à 4, dans lequel le mécanisme de commande comprend des moyens destinés à commander l'alimentation en fluide vers l'agencement piston-cylindre.
6. Ensemble de poussée par à-coups selon l'une quelconque des revendications précédentes, dans lequel le dispositif de poussée par à-coups comprend en outre des moyens destinés à pousser normalement le dispositif dans la position rétractée.
7. Ensemble de poussée par à-coups selon la revendication 6, dans lequel les moyens destinés à pousser normalement le dispositif dans une position rétractée comprennent un ressort de compression.
8. Ensemble de poussée par à-coups selon l'une quelconque des revendications précédentes, dans lequel le mécanisme de commande comprend des moyens destinés à activer d'une manière pouvant être commandée le mécanisme d'entraînement de dispositif de poussée par à-coups.
9. Ensemble de manipulation de feuilles comportant un magasin à feuilles destiné à maintenir une pile de feuilles; une sortie de feuilles vers laquelle des feuilles individuelles sont poussées depuis la pile de feuilles; un dispositif d'alimentation en feuilles destiné à transporter des feuilles individuelles à l'écart de la sortie de feuilles; et un ensemble de poussée par à-coups selon l'une quelconque des revendications précédentes destiné à pousser les feuilles depuis la pile vers la sortie de feuille.
10. Ensemble de manipulation de feuilles selon la revendication 9, lorsqu'elle est rattachée à l'une quelconque des revendications 2 à 7, le magasin de feuilles comprenant une plaque de face contre laquelle des feuilles dans la pile sont poussées, la plaque de face ayant une ou plusieurs ouvertures à travers lesquelles le dispositif de poussée par à-coups peut dépasser, dans lequel mécanisme de commande amène le dispositif de poussée par à-coups à se rétracter à travers la ou les ouvertures lorsque le dispositif d'alimentation en feuilles

n'avance pas des feuilles et sortir à travers la ou les ouvertures lorsque le dispositif d'alimentation en feuilles avance des feuilles.

11. Ensemble de manipulation de feuilles selon la revendication 9 ou la revendication 10, comportant un dispositif de maintien de feuilles destiné à maintenir la feuille avant dans la pile de feuilles, et dans lequel le dispositif de maintien de feuilles est entraîné et commandé indépendamment de l'ensemble de poussée par à-coups. 5 10
12. Ensemble d'alimentation en feuilles selon la revendication 11, dans lequel le dispositif de maintien de feuilles comprend des moyens destinés à appliquer de manière sélective une dépression sur la feuille avant dans la pile de feuilles. 15

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Fig.1.

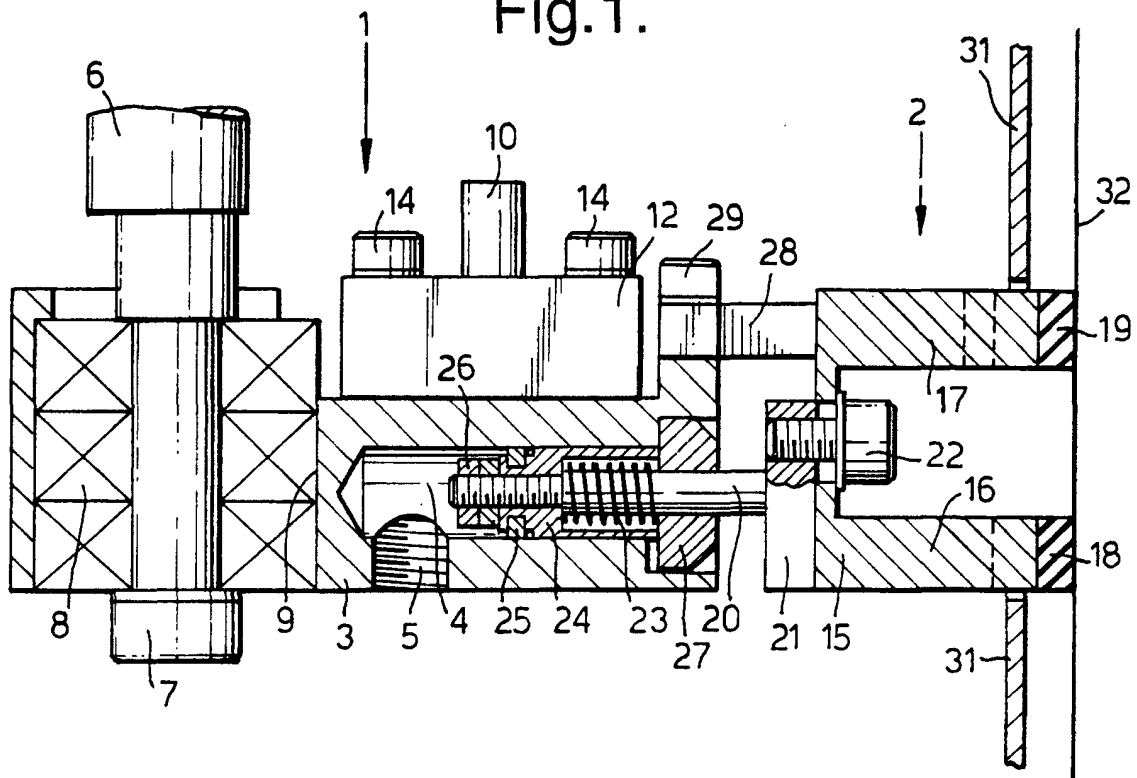


Fig.2.

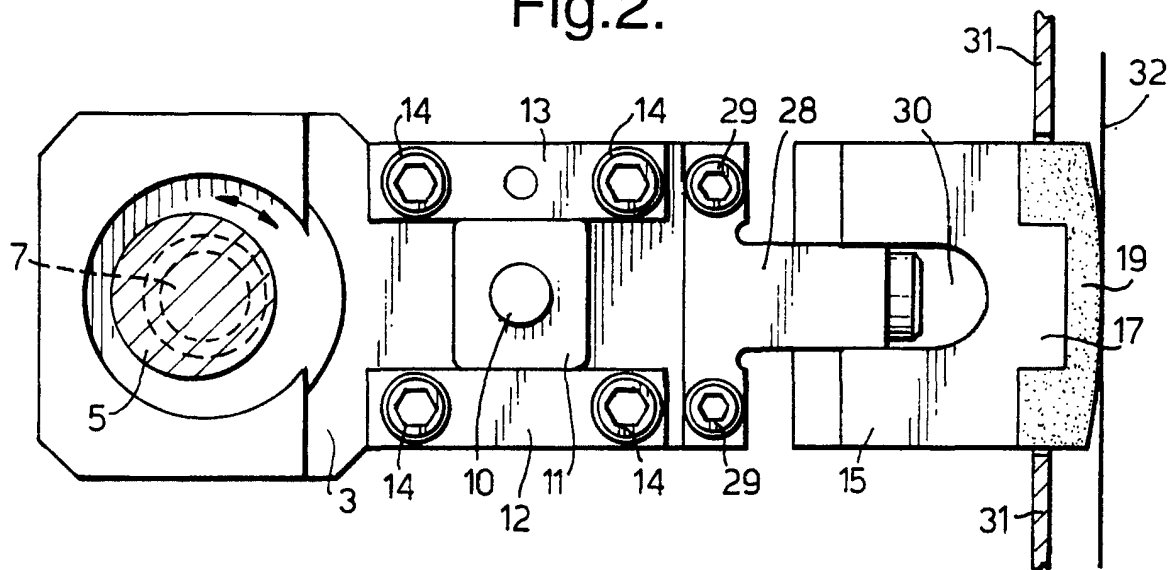


Fig.3.

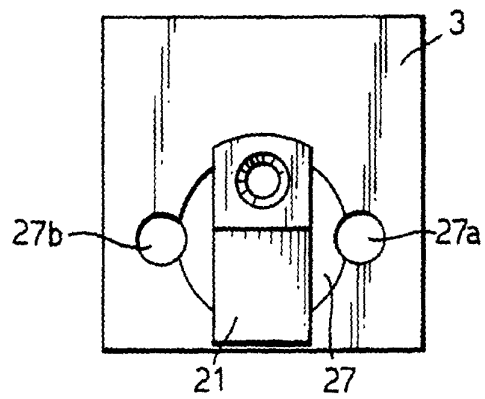


Fig.6.

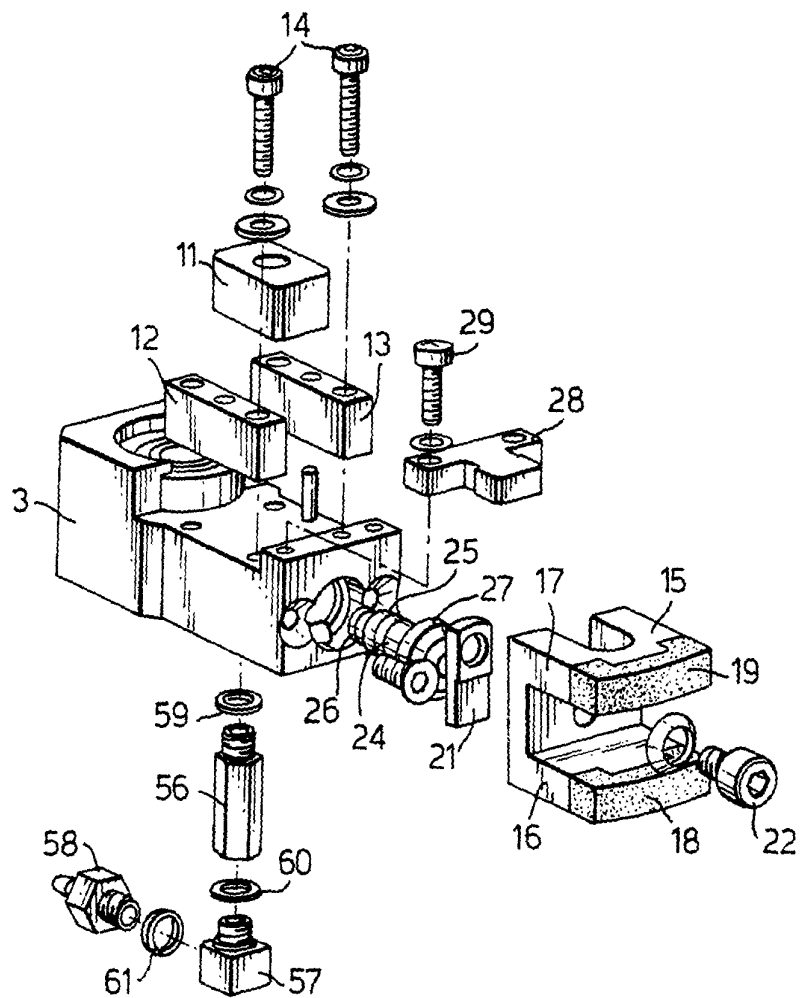


Fig.4.

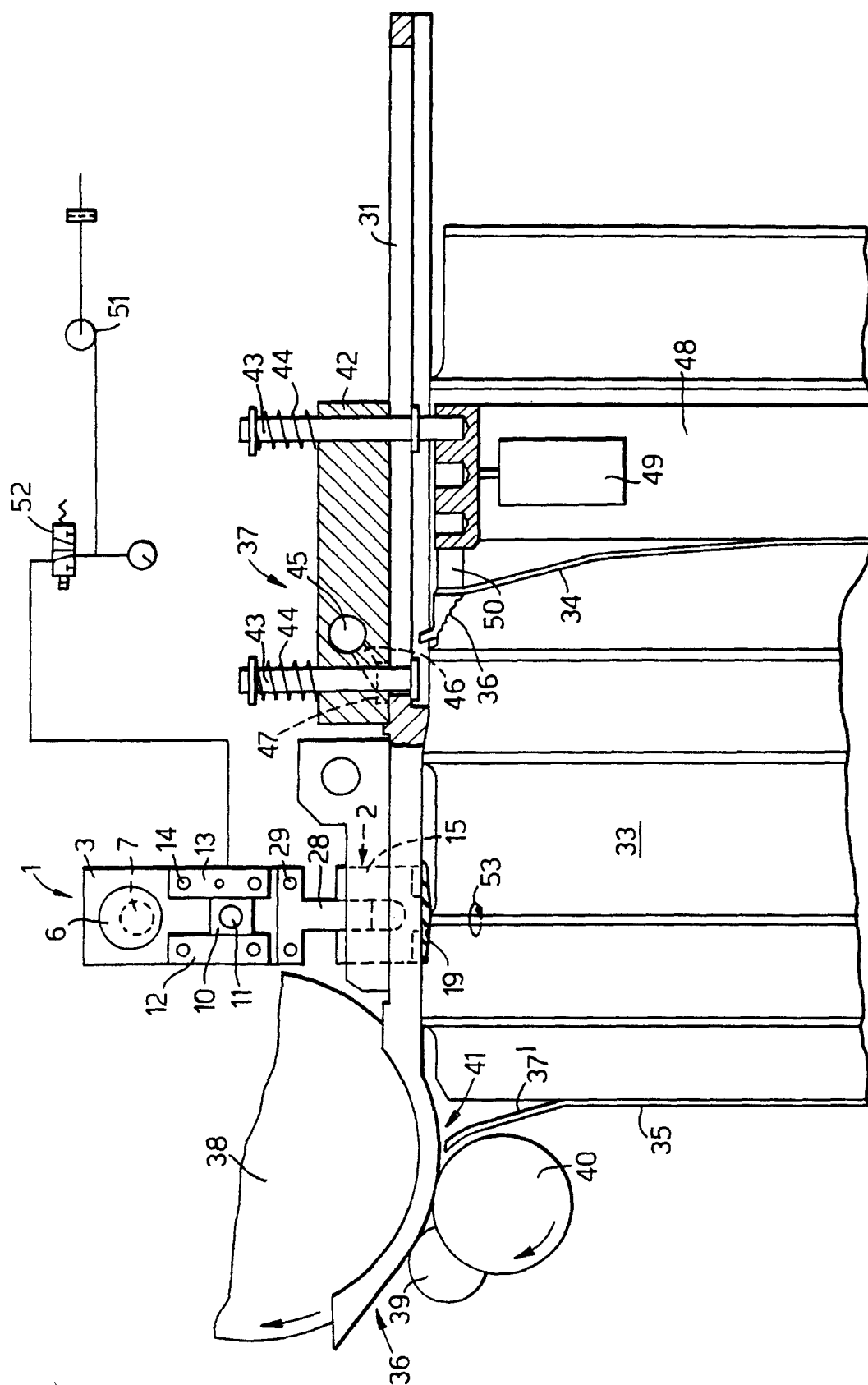


Fig.5.

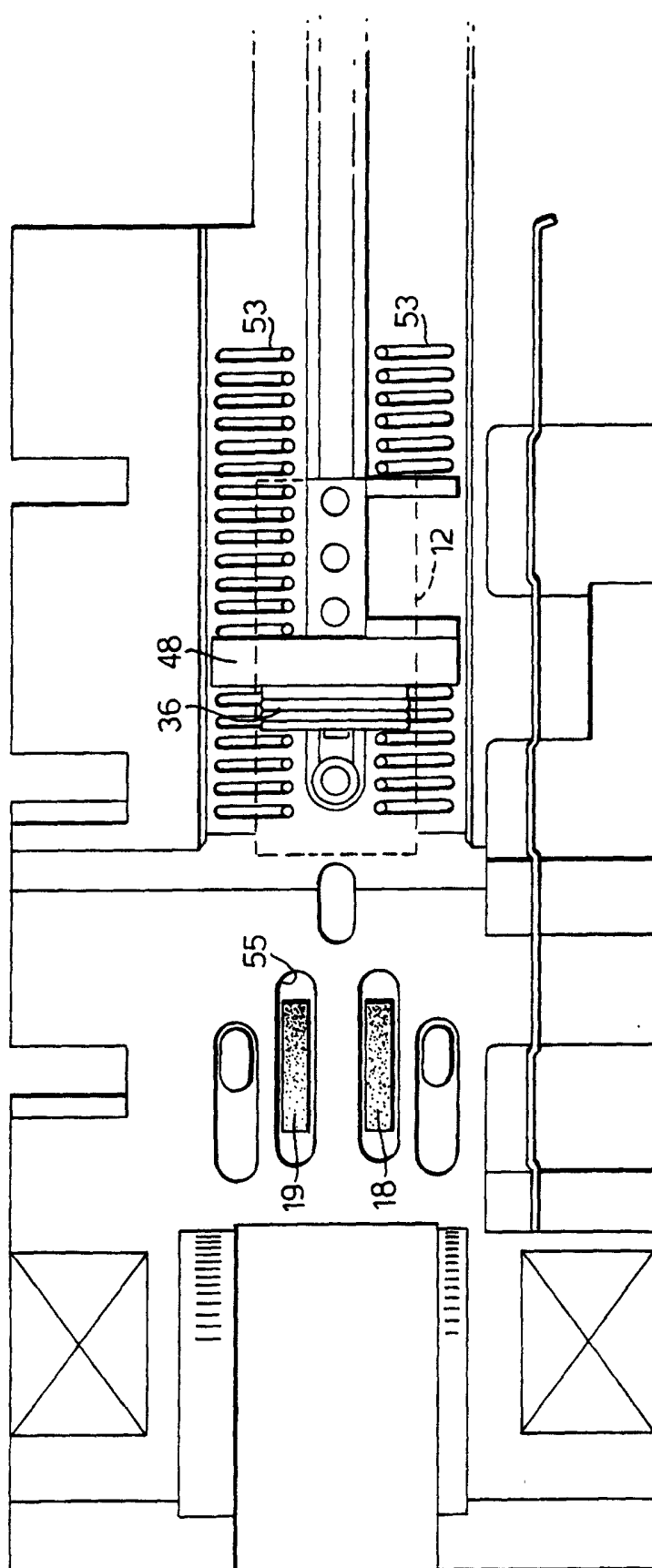


Fig.7.

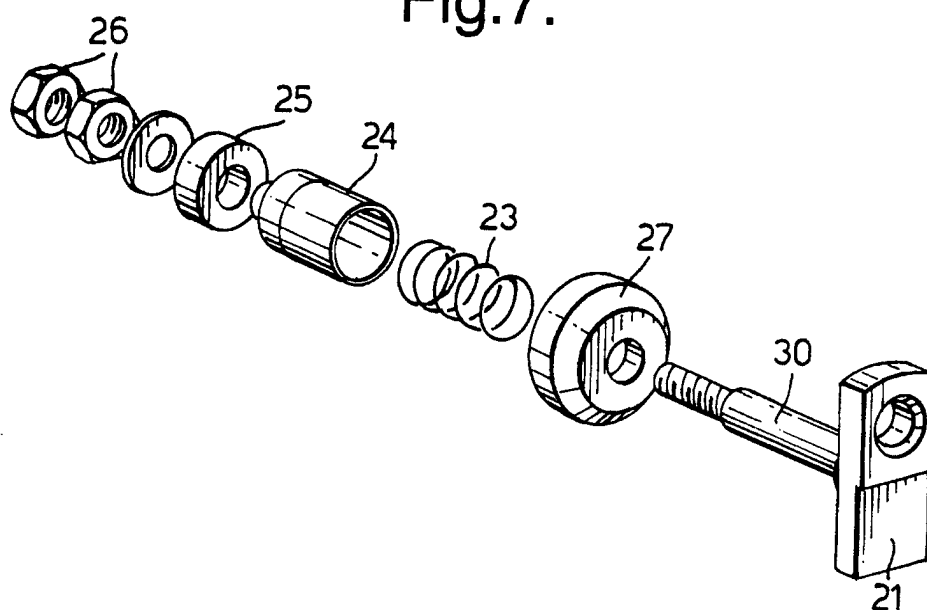


Fig.8.

