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(54) **A machine for automatically removing the scrap from punched and stacked sheets of cardboard or card**

Maschine zur selbsttätigen Entfernung von Abfall-Stücken aus gestanzten und gestapelten Kartonbogen

Machine pour enlever automatiquement les déchets de feuilles en carton empilées et poinçonnées

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Description

The present invention relates to a machine for automatically removing the scrap from sheets of cardboard or card which have been punched and stacked so as to form the so-called "pallets".

It is known that in the paper industry, and in particular in box-factories, the flattened out profiles of all the boxes to be made from a sheet of cardboard or card are punched together after printing. Subsequently, prior to the sending to the folding-glueing machine, each sheet must be cleared from the scrap, in particular from the peripheral one, since the internal scraps are already reduced to a minimum and are often discharged already at the punching step by means of a clearing frame. This usually happens with platens and punching machines manufactured and sold by companies Bobst, Wupa, Iberiea, etc,

Only in exceptional cases of very long runs with the same punching shape there may be provided two automatic clearing stations which obviously require a double frame for each punch, and therefore double tooling and store room required.

It is presently necessary to carry out the scrap removal manually, possibly with hand-held devices such as the one disclosed in CH-A-383139. This device comprises a rotatable disc with circumferential teeth engaging with the scraps and removing them due to the continuous rotation of the disc. Use of such hand-held devices obviously implies, besides the labour cost, long operating times, which can be inadequate to keep up with the upstream production, so that the high operating speed of modern platens is thwarted. Also the problem of the removed scraps' recovery to prevent their accumulation on the floor of the working area is still partially unsolved.

Therefore it is an object of the present invention to provide a machine suitable for automatically removing the scrap from the external sides of the so-called "pallets" in a quick and efficient way, with the greatest safety for the operator and allowing to more easily recover the removed scrap material.

These objects are achieved by means of a machine having the features of claim 1, some particular embodiments thereof being defined in the appended claims.

This machines substantially operates on the principle of subsequent working of the four sides of the "pallet", which automatically makes a 90° rotation as soon as the clearing device has finished its descent along a side thereof while removing all the external scrap. Obviously controls, automatic movements and safety provisions preferably are provided under the central control of a PLC with a double automatic and manual program, the latter being provided with the same safety provisions of the automatic program.

It should be noted that the same machine can be provided with two clearing assemblies on opposite sides of the "pallet" in order to double the operating

speed, since in this case a single 90° rotation is required to complete the scrap removal from the whole periphery.

These and other objects, advantages and characteristics of the machine according to the present invention will be apparent from the following detailed description of a preferred embodiment thereof, reported as a non-limiting example, referring to the annexed drawings wherein:

Fig.1 shows a schematic top plan view of the machine according to the present invention;

Fig.2 shows a schematic side view of the same machine of fig.1;

Fig.3 shows a view in greater detail of a component of fig.1, and precisely of the revolving plate and of the relevant driving cylinders; and

Fig.4 shows an enlarged view of one of the members which make up the clearing device.

Referring to the drawings, the machine according to the present invention substantially includes a steel structure **1** on which a frame **2** and a mobile carriage **3** supporting an assembly **4** for clearing or removing the scrap are mounted. A cylinder **5**, whose piston rod carries at the lower end a disk **5a** to press from above the sheets' "pallet" and keep it compact during the clearing, is mounted vertically on frame **2**. A plate **10**, suitable to act as a support for the stack or "pallet" of sheets to be cleared, is rotatably mounted on a vertical pivot in a middle position within structure **1** and directly below disk **5a**, coaxially to cylinder **5**. A lower plate **10a** suitable to be peripherally engaged for its locking by the mobile member of a cylinder **6** is provided coaxial to the revolving plate **10** and integral therewith. Another cylinder **7** has the end of its piston pivoted to a projection **11** of the revolving plate **10**.

Side guides **12**, **12'** are provided within structure **1**, on opposite sides of the revolving plates **10**, **10a**, and are transversely movable under the action of respective cylinders **8**, **8'**. Another pair of cylinders **9**, **9'** parallel thereto are provided inwards with respect to structure **1** and guides **12**, **12'**, on the opposite side of cylinder **6** with respect to the revolving plates **10**, **10a**, so as to form with their mobile members a stop, in the direction indicated by arrow A, for the pallet positioned on plate **10**.

The operating cycle, when the machine is in automatic mode, provides that when the "pallet" is positioned on plate **10** one of cylinders **8**, **8'** is extended (and the other one is at rest, retracted), as well as the two cylinders **9**, **9'**, whereas cylinders **5** and **7** are retracted, in rest position. At this moment, all motors provided on carriage **3** are not running, namely motor **13** suitable to drive carriage **3** along the structure in any known way, but preferably by means of worms, motor **14** suitable to drive the clearing assembly **4** and motor **15** for the reciprocating vertical motion of said assembly **4**

together with motor 14. Furthermore, the position of carriage 3 and of the clearing assembly 4 (carriage 3 farthest from frame 2 and the clearing assembly 4 in the highest position) is such that sensors 25 and 28 are triggered, respectively the last of three sensors (23, 24, 25) located on structure 1 by carriage 3 in the direction of arrow A, and the higher of two sensors (27, 28) vertically located on carriage 3. Other two sensors 21, 22 are also provided, respectively located on cylinders 8, 8', as well as some safety sensors (29, 30, 31) for the regular movement of carriage 3 and finally two sensors 32, 33 respectively located by cylinders 6 and 7. Various photocells are also provided, which at the beginning of the operating cycle are all clear, and they will be described from time to time when the description of the operation will make it necessary.

A first pair of photocells 16 is provided before guides 12, 12' so that upon inserting the stack or "pallet" of sheets therebetween in the direction of arrow A, the photocells are first blanked and then cleared when the pallet is correctly positioned on plate 10. This activation of photocells 16 puts the machine in emergency condition as far as the operator's safety is concerned, whereby the machine can start again only upon pressing proper pushbuttons located on the switchboard (not shown in the drawings). The correct positioning of the pallet against both one of guides 12, 12' and the front stop consisting of the two cylinders 9, 9' causes the blanking of another pair of photocells 17 (figs.1 and 2) located on the sides of structure 1, which indicate to the central microprocessor that the load has been introduced.

Once the above-mentioned pushbuttons have been pressed (e.g. "reset and cycle start"), the pallet is blocked by activating cylinder 5, which lowers disk 5a to block the sheets from above, as well as the still resting second side cylinder (8, 8') which completes the blocking of the sheets' stack, while cylinders 9, 9' retract their pistons to the rest position.

Subsequently, motor 13 is activated to drive carriage 3 forward until its motion is stopped by another pair of photocells being blanked, namely those indicated with 18 in figs.1 and 2. As previously mentioned, this motion is preferably carried out by means of worms driven by motor 13.

The same photocells 18 control the activation of motor 15 which drives the clearing assembly 4 downwards until it blanks another pair of photocells 19, located at a specific height on carriage 3, at an intermediate position between sensors 27 and 28. These photocells control the further advancing of carriage 3 driven by motor 13 until a feeler 26, mounted on the carriage and projecting therefrom beyond the clearing assembly 4, detects the presence of the pallet and therefore the correct position for operating the clearers by activating motor 14. Simultaneously, the clearing assembly 4 is moved down along one side of the pallet by activating motor 15.

It should be noted that feeler 26, while moving down together with the clearing assembly 4, follows the pallet's profile and corrects the position of carriage 3 by means of its sensor, while an electronic board provides the adjustment of the force exerted by motor 14 according to the resistance against the scrap removal and to the descent speed of the clearing assembly. When the clearing assembly 4, during its descent, meets the lower sensor 27, the latter stops said descent by stopping motor 15 as well as motor 14 for stopping the operation of the clearing assembly 4. Thereafter, motor 15 is reactivated to take back upwards the clearing assembly, while also motor 13 is activated to take back carriage to the starting rear position, until sensors 28 and 24, respectively, are triggered. The triggering of said sensors controls the retraction of cylinders 8, 8' which thus release the side guides 12, 12' while triggering sensors 21 and 22. These in turn control the rotation of the revolving plate 10.

In particular, with reference to fig.3, cylinder 6 is first retracted, so as to disengage the lower plate 10a and thus unlock plate 10, integral therewith, which rotatably supports the pallet. This retraction triggers sensor 32 which activates cylinder 7 to extend the mobile part thereof up to the position indicated in fig.3 by dotted lines, while having projection 11 of plate 10 make a clockwise rotation of about 45°. More precisely, the pivot point between cylinder 7 and projection 11 is connected to a free wheel (not shown in the figure), and at the end of said 45° rotation the projection 11 engages a microswitch 34 which controls the immediate return of cylinder 7 to its starting retracted position, at which the other sensor 33 starts a second extension of cylinder 7 for a further 45° rotation until projection 11 engages microswitch 34 again. Therefore, the revolving plate 10 has made a 90° rotation thus placing in front of the clearing assembly 4 a second side of the pallet, adjacent to the first one and not yet cleared. The further triggering of microswitch 34 controls the return of cylinder 7 to the retracted position, at which sensor 33 now activates cylinder 6 to go back into engagement with plate 10a thus locking the revolving plate 10 in the new rotated position. The triggering of sensor 32 indicates to the PLC that the rotation and locking of the plate have been completed, and now the clearing cycle on the second side starts, as mentioned above.

After three 90° rotations and after the clearing of the fourth pallet side is over, cylinder 7 is activated for the fourth time for the last 90° rotation, whereby the pallet is positioned again as it was at the beginning of the operating cycle, with the side cleared for first which is facing assembly 4 again. Cylinders 8, 8' are moved so as to position guides 12, 12' as initially provided to receive the following pallet, as well as cylinders 9, 9' which also take the stopping position. A second operating cycle can now start, which, it should be noted, can also be carried out manually by rotating the relevant selector on the "manual" position and carrying out all

the operating steps of the "automatic" cycle by acting from time to time on the relevant controls provided on the switchboard (not shown). The latter also includes four depth correctors (one for each side) in order to achieve the correct positioning of the clearing assembly 4. In fact, it is to be noted that the scraps present on the four sides usually have different depths, thus making said corrections absolutely necessary, which however can be varied during the positioning within the machine.

Obviously, as already mentioned, two clearing assemblies 4 can be provided, which operate simultaneously on two opposite sides of the pallet, thus requiring a single 90° rotation to complete the operating cycle.

In order to complete the description of the functions of the various sensors, it should be noted that those indicated with 29, 30 and 31 are safety sensors for the regular movement of carriage 3, while sensor 23 is a forward limit switch of the carriage and sensor 31 is a safety sensor for the rotation of the clearers.

Referring to fig.4, a preferred embodiment of a single clearing member 4a is now described in detail. The clearing assembly 4 is made up of a plurality of said members 4a placed side by side, all pivoted onto a common shaft 34, driven by motor 14, by means of eccentric cams 35, and pivoted in a second point to a pin 36 connected to the supporting structure of the clearing assembly 4 through a support 37. The shape of each clearing member is a lever extending towards the free end opposite to the pivot end on shaft 34. This free end, which is the real working tool, is preferably provided with a toothed end 38 to favour the gripping on the edges of the pallet to be cleared from the scrap. Pin 36 is in an intermediate position between shaft 34 with cam 35 and end 38. The lever members 4a are mounted on the clearing assembly 4 uniformly spaced and so as to have the eccentricity "e" alternately facing opposite directions for adjacent members. In other words, while eccentricity "e" is directed, in the drawing of fig.4, towards pin 36, in the adjacent member it is opposite, with the eccentric portion of cam 35 facing rearwards, and therefore the corresponding clearing member is shifted forward with respect to the illustrated one. In this way, at every rotation of shaft 34 each lever member 4a makes a rotatory movement, around pin 36, which is staggered with respect to the movement made by the adjacent members, due to the different eccentricity. Therefore, there is obtained a forward-and-down movement alternate with a backward-and-up movement, which facilitates the positioning of the toothed ends 38 on the scrap and the subsequent removal thereof to go back to the starting position with a backward-and-up movement. It has been found that having alternate sequences for the movement of adjacent clearing members, whereby while one is going up back the adjacent one is carrying out the scrap removal in its relevant area, doubles the clearing speed with really surprising results, in that a pallet about 1.5 m high is cleared from the scrap in less than one minute per side.

Though it has not been shown in the drawings, a suction can be provided with a collecting mouth by the clearing assembly 4, and mobile therewith, so that the parts of removed scrap are directly conveyed to a recovery container thus leaving the operating environment almost free from waste.

Also, there is not shown the possibility of providing the machine with two clearing assemblies operating simultaneously, as already mentioned above, on two opposite sides of the pallet, whereby in this case a single 90° rotation is sufficient to clear all the pallet sides in just two steps, with a significant time saving.

Possible additions and/or modifications may be made by those skilled in the art to the above-described and illustrated embodiment of the machine according to the present invention, yet without departing from the scope of the invention as defined by the claims. In particular, changes may be provided to the automatic devices controlling the operating cycle, and therefore in the arrangement of sensors and photocells, as well as a replacement thereof with equivalent devices. Also the mechanical parts may be replaced with equivalents thereof, and in particular the shape of the individual clearing members 4a may be changed.

Finally, in coincidence with the scrap removal station, a station may be provided for wrapping the pallet with a plastic film as a temporary protection before passing on to the folding-glueing machine and as package in case of transport. The revolving plate 10 acts as a winder, when it is continuously rotated with the pallet thereon already cleared from the scrap, to which pallet there has been adhered the outer web of a film reel which is unrolled, with a certain tension, by rotating around an axis integral with the machine while plate 10 is rotated. The winding may also take place side after side during the clearing operation, rather than continuously.

Claims

1. A machine for automatically removing scraps from the periphery of a pile of punched sheets of cardboard or card, including a longitudinal structure (1) defining an operating station at a vertical frame (2), a cylinder (5) mounted on said vertical frame (2) to block from above the stack of sheets to be worked, a lower revolving plate (10) for supporting the stack, means (7) suitable to control the rotation of said revolving plate (10), means (6) to lock the latter in a selected position, front stop means (9, 9') and side guides (12, 12') within the structure (1) for the correct horizontal positioning of the stack of sheets on the plate (10), and a carriage (3) horizontally slidable to and fro along said structure (1) up to said operating station, a clearing assembly (4) being mounted on said carriage (3) so as to be vertically mobile up and down and comprising a plurality of clearing members (4a) uniformly spaced side by

- side along a rotatable common shaft (34) on which they are pivotally mounted to carry out alternately forward-and-down movements and backward-and-up movements of adjacent clearing members at each revolution of said shaft (34), said shaft (34) being rotatable by a motor (14) mounted on said carriage (3) so as to be vertically slidable together with said clearing assembly (4), another motor (15) being provided for vertically moving the motor (14) and the clearing assembly (4), and a third motor (13) being provided for horizontally moving the carriage (3).
2. A machine according to claim 1, characterized in that each clearing member (4a) is made up of an elongated lever pivoted at one end, through an eccentric cam (35), to a common shaft (34) driven by said motor (14), and provided at the opposite free end with a toothed end (38), being pivoted in an intermediate area, through a pin (36), to the structure of the clearing assembly (4).
3. A machine according to claim 2, characterized in that the eccentricity (e), equal to the distance between the axis of the shaft (34) and the center of the eccentric cam (35), has an opposite sign for adjacent clearing members (4a) of the plurality of members arranged side by side, whereby the rotary motion made by the end (38) of adjacent members (4a) is out of phase by 180° at every rotation of the shaft (34).
4. A machine according to any of the preceding claims, characterized in that said means (7) suitable to control the rotation of said revolving plate (10) consist of a cylinder whose mobile end is pivoted, through a projection (11), to a free wheel connected to said revolving plate (10), whereby at each extension of said cylinder (7) the rotation of said plate (10) is about of 45°, a microswitch (34) being provided suitable to control the return of said cylinder (7) in the retracted position in order to trigger a sensor (33) which starts a further 45° rotation for completing the 90° rotation of the revolving plate (10), the second triggering of the sensor (33) upon the subsequent return of the cylinder (7) in the retracted position resulting in the activation of a cylinder (6) which locks a plate (10a) coaxial and integral with said revolving plate (10).
5. A machine according to claim 4, characterized in that a sensor (32) is provided, at said locking cylinder (6), suitable to allow the rotation controlled by said cylinder (7) only when the locking cylinder (6) is retracted in the disengagement position, and also allowing the activation of the motor (14) driving the clearing assembly (4) only when the locking cylinder (6) is extended in the engagement position.
6. A machine according to any of the preceding claims, characterized in that a feeler (26) is provided, mounted on the carriage (3) integrally with the clearing assembly (4), which projects beyond the free end of the single clearing members (4a) and suitable to control the position of the carriage (3), by activating the motor (13), during the clearing operation by following the profile of the stack of sheets to be cleared from the scrap.
7. A machine according to any of the preceding claims, characterized in that it includes limit switches both for the horizontal movement of the carriage (3) and for the vertical movement of the clearing assembly (4).
8. A machine according to claim 1, characterized in that it includes two clearing assemblies (4) at two opposite sides of the structure (1) for simultaneously removing the scrap on two opposite sides of the stack of sheets.

Patentansprüche

1. Maschine zur selbsttätigen Entfernung von Abfallstücken aus der Umgebung eines Stapels von gestanzten Kartonbögen oder Pappe, umfassend eine Längsstruktur (1), die eine Arbeitsstation an einem vertikalen Rahmen (2) definiert, einen Zylinder (5), der an diesem vertikalen Rahmen (2) montiert ist, um den zu bearbeitenden Stapel von Blättern von oben zu blockieren, eine untere Drehplatte (10) zum Abstützen des Stapels, Einrichtungen (7), welche geeignet sind, die Drehung der genannten Drehplatte (10) zu steuern, Einrichtungen (6), um die letztere in einer gewählten Position zu verriegeln, vordere Stopeinrichtungen (9, 9') und Seitenführungen (12, 12') innerhalb der Struktur (1) für die korrekte horizontale Positionierung des Stapels von Blättern auf der Platte (10) und einen Schlitten (3), der horizontal entlang der Struktur (1) bis zur Arbeitsstation hin- und hergleitbar angeordnet ist, eine Reinigungsanordnung, die auf dem Schlitten (3) angeordnet ist, um vertikal nach oben und unten bewegbar zu sein und umfassend eine Mehrzahl von Reinigungselementen (4a), die gleichmäßig nebeneinander beabstandet entlang einer rotierbaren gemeinsamen Welle (34) angeordnet sind, an welcher sie drehbar montiert sind, um alternierend Vorwärts- und Abwärtsbewegungen und Rückwärts- und Aufwärtsbewegungen von benachbarten Reinigungselementen bei jeder Drehung der Welle (34) auszuführen, wobei die Welle (34) drehbar durch einen Motor (14) auf den Schlitten (3) montiert ist, um vertikal gleitbar gemeinsam mit der Reinigungseinrichtung (4) zu sein, wobei ein weiterer Motor für eine Vertikalbewegung des Motors (14) und der Reinigungsanordnung (4) vor-

gesehen ist und ein dritter Motor (13) für die horizontale Bewegung des Schlittens (3) vorgesehen ist.

2. Maschine nach Anspruch 1, dadurch gekennzeichnet, daß jedes Reinigungselement (4a) von einem verlängerten Hebel gebildet ist, der an einem Ende durch einen exzentrischen Nocken (35) schwenkbar an einer gemeinsamen Welle (34), die durch den Motor (14) angetrieben ist, und an dem gegenüberliegenden, freien Ende mit einem gezahnten Ende (38) versehen ist, welches in einem Zwischenbereich durch einen Stift (36) zu der Struktur der Reinigungsanordnung (4) schwenkbar ist. 5

3. Maschine nach Anspruch 2, dadurch gekennzeichnet, daß die Exzentrizität (e), welche gleich dem Abstand zwischen der Achse der Welle (34) und dem Zentrum des exzentrischen Nockens (35) ist, ein umgekehrtes Vorzeichen für benachbarte Reinigungselemente (4a) aus der Mehrzahl von Elementen, die nebeneinander angeordnet sind, aufweist, wodurch die Drehbewegung, die durch das Ende (38) von benachbarten Elementen (4a) durchgeführt wird, bei jeder Rotation der Welle (34) um 180° außer Phase ist. 10

4. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die für die Steuerung der Rotation der Drehplatte (10) geeigneten Einrichtungen (7) aus einem Zylinder bestehen, dessen bewegbares Ende durch einen Vorsprung (11) an einem mit der Drehplatte (10) verbundenen Freilauf verschwenkt wird, wobei an jeder Erstreckung des Zylinders (7) die Drehung der Platte (10) etwa 45° beträgt, wobei ein Mikroschalter (34) vorgesehen ist, der für die Steuerung der Rückkehr des Zylinders (7) in die zurückgezogene Position geeignet ist, um einen Sensor (33), welcher eine weitere 45°-Drehung zur Vervollständigung der 90°-Drehung der Drehplatte (10) startet, auszulösen, wobei ein zweites Auslösen des Sensors (33) nach der darauffolgenden Rückkehr des Zylinders (7) in die zurückgezogene Position in der Aktivierung eines Zylinders (6) resultiert, welcher eine Platte (10) koaxial und gemeinsam mit der Drehplatte (10) verriegelt. 15

5. Maschine nach Anspruch 4, dadurch gekennzeichnet, daß ein Sensor (32) an dem Sperrzylinder (6) vorgesehen ist, der geeignet ist, um eine durch den Zylinder (7) gesteuerte Rotation nur zu erlauben, wenn der Sperrzylinder (6) in die außer Eingriff befindliche Position zurückgezogen ist, und auch um die Aktivierung des Motors (14), der die Reinigungsanordnung (4) antreibt, dann zu ermöglichen, wenn der Sperrzylinder (6) in die Eingriffsposition 20

ausgefahren ist.

6. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß ein Fühler (26) vorgesehen ist, der auf dem Schlitten (3) gemeinsam mit der Reinigungsanordnung (4) angeordnet ist, welcher über das freie Ende der einzelnen Reinigungselemente (4a) vorragt und geeignet ist, die Position des Schlittens (3) durch Aktivierung des Motors (13) während des Reinigungsvorgangs durch Folgen des Profils des Stapels von von dem Abfall zu reinigenden Blättern zu steuern. 25

7. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß sie Begrenzungsschalter sowohl für die horizontale Bewegung des Schlittens (3) als auch für die vertikale Bewegung der Reinigungsanordnung (4) aufweist. 30

8. Maschine nach Anspruch 1, dadurch gekennzeichnet, daß sie zwei Reinigungsanordnungen (4) an zwei gegenüberliegenden Seiten der Struktur (1) für das gleichzeitige Entfernen des Abfalls von zwei gegenüberliegenden Seiten des Stapels von Blättern umfaßt. 35

Revendications

1. Machine pour enlever automatiquement des déchets de la périphérie d'une pile de feuilles en carton poinçonnées, comprenant une structure longitudinale (1) définissant une station de fonctionnement au niveau d'un cadre vertical, un cylindre (5) monté sur ledit cadre vertical (2) pour bloquer à partir du dessus la pile de feuilles à travailler, une plaque tournante inférieure (10) pour supporter la pile, des moyens (7) appropriés pour commander la rotation de ladite plaque tournante (10), des moyens (6) pour verrouiller cette dernière dans une position sélectionnée, des moyens d'arrêt avant (9, 9') et des guides latéraux (12, 12') dans la structure (1) pour le positionnement horizontal correct de la pile de feuilles sur la plaque (10) et un chariot (3) pouvant coulisser horizontalement vers et en éloignement le long de ladite structure (1) jusqu'à ladite station de fonctionnement, un assemblage de nettoyage (4) étant monté sur ledit chariot de manière à être mobile verticalement vers le haut et vers le bas et comprenant une pluralité d'éléments de nettoyage (4a) espacés uniformément côte à côte le long d'un arbre rotatif commun (34) sur lequel ils sont montés de manière pivotante pour réaliser alternativement des mouvements vers l'avant et le bas et vers l'arrière et le haut d'éléments de nettoyage adjacents à chaque révolution dudit arbre (34), ledit arbre (34) étant tourné par un moteur (14) monté sur ledit chariot (3) de manière à être coulissant verticalement ensemble avec ledit 40

- assemblage de nettoyage (4), un autre moteur (15) étant prévu pour déplacer verticalement le moteur (14) et l'assemblage de nettoyage (4), et un troisième moteur (13) étant prévu pour déplacer horizontalement le chariot (3). 5
2. Machine selon la revendication 1, caractérisée en ce que chaque élément de nettoyage (4a) est réalisé sous la forme d'un levier allongé pivoté à une extrémité, par une came excentrée (35), sur un arbre commun (34) entraîné par ledit moteur (14), et qui est pourvu à l'extrémité libre opposée d'une extrémité dentelée (38) qui est pivotée dans une zone intermédiaire, à travers une cheville (36), sur la structure de l'assemblage de nettoyage (4). 10 15
3. Machine selon la revendication 2, caractérisée en ce que l'excentricité (e), qui est égale à la distance entre l'axe de l'arbre (34) et le centre de la came excentrée (35), a un signe opposé pour les éléments de nettoyage adjacents (4a) de la pluralité d'éléments arrangés côte à côte, de sorte que le mouvement rotatif réalisé par l'extrémité (38) des éléments adjacents (4a) est déphasé de 180° à chaque rotation de l'arbre (34). 20 25
4. Machine selon l'une quelconque des revendications précédentes, caractérisée en ce que lesdits moyens (7) adaptés à commander la rotation de ladite plaque tournante (10) sont constitués d'un cylindre dont l'extrémité mobile est pivotée par une projection (11), sur une roue libre connectée à ladite plaque tournante (10) de sorte qu'à chaque extension dudit cylindre (7) la rotation de ladite plaque (10) est d'environ 45°, un micro-commutateur (34) étant prévu adapté à commander le retour dudit cylindre (7) dans la position rétractée afin de déclencher un capteur (33) qui démarre une rotation supplémentaire de 45° pour compléter la rotation de 90° de la plaque tournante (10), le second déclenchement du capteur (33) lors du retour suivant du cylindre (7) dans la position rétractée résultant dans l'activation d'un cylindre (6) qui verrouille une plaque (10a) coaxiale et monobloc avec ladite plaque tournante (10). 30 35 40 45
5. Machine selon la revendication 4, caractérisée en ce qu'un capteur (32) est prévu, au niveau dudit cylindre de verrouillage (6), adapté à permettre la rotation commandée par ledit cylindre (7) seulement lorsque le cylindre de verrouillage (6) est rétracté dans la position désengagée, et également de permettre l'activation du moteur (14) entraînant l'assemblage de nettoyage (4) seulement lorsque le cylindre de verrouillage (6) est étendu dans la position en prise. 50 55
6. Machine selon l'une quelconque des revendications précédentes, caractérisée en ce qu'un palpeur (26) est prévu, monté sur le chariot (3) de manière monobloc avec l'assemblage de nettoyage (4), qui se projette au-delà de l'extrémité libre des éléments de nettoyage individuels (4) et approprié à commander la position du chariot (3), en activant le moteur (13), pendant l'opération de nettoyage en suivant le profil de la pile de feuille qui doit être nettoyé des déchets.
7. Machine selon l'une quelconque des revendications précédentes, caractérisée en ce qu'elle comprend des commutateurs de limite à la fois pour le mouvement horizontal du chariot (2) et pour le mouvement vertical de l'assemblage de nettoyage (4).
8. Machine selon la revendication 1, caractérisée en ce qu'elle comprend deux assemblages de nettoyage (4) à des côtés opposés de la structure (1) pour enlever simultanément les déchets sur les deux côtés opposés de la pile de feuille.

FIG. 2

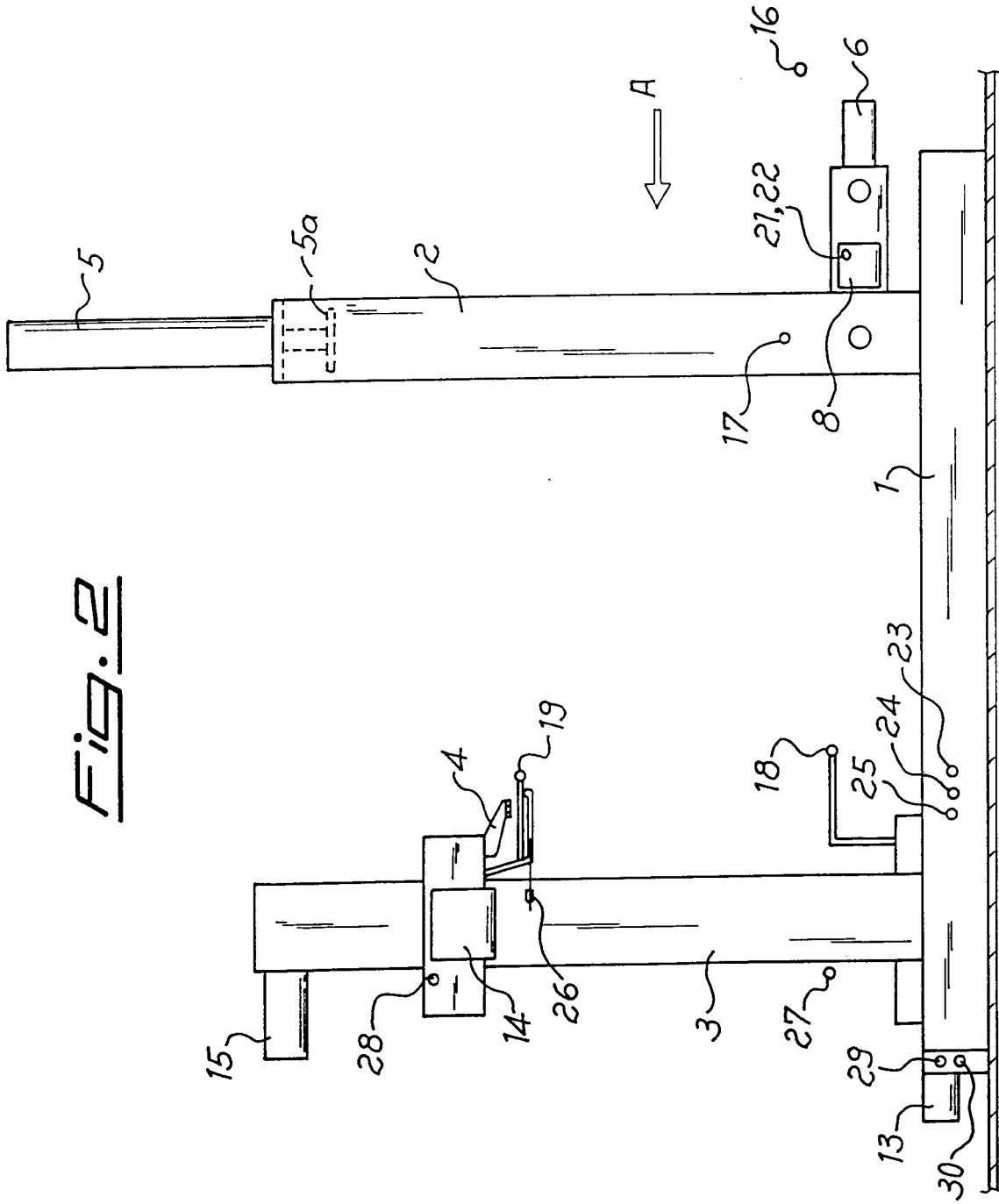


Fig. 3

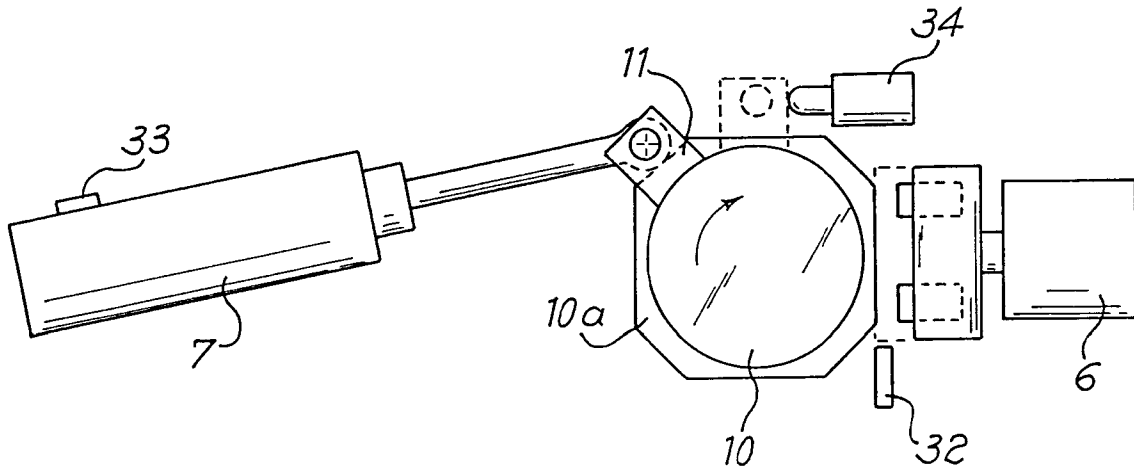


Fig. 4

