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(54) **Agitator apparatus for mixing paints, lacquers and the like**

Rührvorrichtung zum Mischen von Farben, Lacken und dergleichen

Dispositif d'agitation pour mélanger des peintures, laques et équivalents

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DE-A- 3 111 437 DE-U- 9 407 810

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Description

[0001] The present invention relates to an agitator apparatus for mixing paints, lacquers and the like.

[0002] Currently devices known as paint mixing stations are widely used and allow to prepare any selected color from a limited number of base colors by mixing said base colors in appropriate doses.

[0003] This spares color manufacturers from having to prepare colors in a very large number of shades, with consequent manufacturing and storage problems, and also allows retailers to have a very small stock of color cans, with the advantage of not having colors that are unlikely to be sold but nonetheless must be part of stock reserves because a customer might ask for them.

[0004] Accordingly, these devices have introduced a considerable advantage for paint manufacturers and for retailers as well as for end customers, who can enjoy lower retail prices.

[0005] However, mixing multiple base colors in appropriate doses in order to obtain a preset final color entails not only the need to mix together the base colors but also the need to achieve their complete amalgamation so that the resulting color is perfectly uniform.

[0006] For this purpose, known types of devices have agitator elements, such as paddles and the like, which are inserted in the can that contains the plurality of base colors used for the mix and which amalgamate the products more or less effectively when they are turned.

[0007] However, this method is useful only for preparing large amounts of lacquer or paint in the same shade. When the color of the lacquer or paint to be amalgamated changes, it is obviously necessary to replace the agitator elements with other clean ones or to clean the previously used agitator element.

[0008] This clearly entails long times for replacement and cleaning of the dirty agitator element, thereby affecting the cost of the product; moreover, if two customers are waiting at the point of sale, this of course increases the time required to prepare the lacquer or paint that the customer wishes to purchase.

[0009] Stand-alone agitator apparatuses are currently known for this purpose as a replacement of the above cited agitator elements; in these apparatuses, a motor drives a number of gear pairs by way of a belt and a pulley in order to turn, like a gyroscope, the can of paint containing the plurality of base colors to be amalgamated, such can being clamped between two plates which are arranged respectively in contact with the top and bottom surfaces of the can.

[0010] Moreover, in view of the large mass to be turned, this solution entails the presence of a motor which is powerful enough to turn the entire assembly and overcome frictions.

[0011] Moreover, the complexity of the structure entails a significant final cost of said agitator apparatus.

[0012] Another solution, disclosed in Italian utility model application no. PV97U 000006, provides for the

presence of two mutually coaxial shafts which are respectively actuated by an electric motor and of a support for a lower plate, which can be moved manually forward in order to load a can of lacquer and cooperates with an upper support which carries an upper plate for locking the can. One of the two shafts drives the upper plate in rotation in order to turn the container about its own axis, while the second shaft, which is coaxial to the first one, drives a secondary shaft which has, at its end, a worm screw in order to move the two plates closer or further apart one another. A fork-like element, actuated by the first shaft, turns the two plates about an axis which is perpendicular to the axis of the can of paint. In this manner, the agitator apparatus allows to turn the can both about its own axis and about an axis which is perpendicular to the axis of the can.

[0013] This allows to achieve effective amalgamation of the product.

[0014] However, although the above proposed solution is satisfactory from the point of view of the capacity to mix the base colors that are present in the can, it is affected by drawbacks caused by the fact that the partial extraction of the lower plate reduces the operating capability in terms of loading and unloading the cans of color.

[0015] The known apparatus further has an insufficient mechanism for locking the lower plate in the extraction position.

[0016] Moreover, the lack of a mechanical control which ascertains that the closure of the plates with the can loaded thereon causes the operation of the apparatus to be unreliable, with problems of breakage if the loaded can loses its position.

[0017] Moreover, the minimum downward stroke for the closure of the plates is insufficient to accept the smallest size of current commercially available color cans.

[0018] Finally, the known apparatus is not provided with a system for controlling the maximum stroke limit when the plates are fully open; if the plates are fully opened by mistake or manually, the worm screw reaches a dead point and accordingly the mechanism jams, thus requiring a manual reset.

[0019] Another such apparatus, according to the preamble of appended claim 1, is known from document EP-A-0 955 081.

[0020] The aim of the present invention is to provide an agitator apparatus for mixing lacquers, paints and the like in which the movement for clamping the arms with the corresponding plates around the can of lacquer or paint is performed in a controlled manner and the rotation of the can is started only after clamping has been performed.

[0021] Within the scope of this aim, an object of the present invention is to provide an agitator apparatus for mixing lacquers, paints and the like in which the lower plate can be extracted completely in order to facilitate the loading of the can of lacquer or paint.

[0022] Another object of the present invention is to provide an agitator apparatus for mixing lacquers, paints or the like in which an accidental opening of the arms with the corresponding plates arranged around the can of lacquer or paint is avoided during the rotation of the can for mixing the lacquer or paint.

[0023] Another object of the present invention is to provide an agitator apparatus for mixing lacquers, paints or the like in which the can is turned by means of two simultaneous rotary motions about mutually perpendicular axes.

[0024] Another object of the present invention is to provide an agitator apparatus for mixing lacquers, paints or the like which is highly reliable, relatively simple to manufacture and at competitive costs.

[0025] This aim and these and other objects which will become better apparent hereinafter are achieved by an agitator apparatus for mixing lacquers, paints and the like, according to claim 1. Preferred embodiments are defined in the dependent claims.

[0026] Further characteristics and advantages of the invention will become better apparent from the following description of a preferred but not exclusive embodiment of the apparatus according to the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a sectional lateral elevation view of the agitator apparatus according to the invention;
Figure 2 is a sectional bottom plan view of the agitator apparatus according to the invention; and
Figure 3 is a cutout side elevation view of the apparatus according to the present invention.

[0027] With reference to the figures, the agitator apparatus according to the invention comprises a supporting frame 1, inside which a flanged sleeve 2 is rigidly fixed; a hollow shaft 3 is in turn inserted in said sleeve and two sliding guides 4 are bolted thereto.

[0028] The hollow shaft 3 is actuated by movement means 27 being conveniently constituted for example by an electric motor which turns the hollow shaft 3 by way of a belt-and-pulley transmission.

[0029] Means 5 for the actuation of two arms 6 and 7 are suitable to move said arms along the guides 4 symmetrically with respect to the rotation of the hollow shaft 3.

[0030] Said means for the actuation of the arms 6 and 7 are conveniently constituted, for example, by a right and left trapezoidal screw.

[0031] The trapezoidal screw 5 is actuated by a bevel gear pair 8 having a shaft 9 which is provided, at one end, with a hexagonal hole for the engagement of a hexagonal shaft 10, being actuated by a pulley which is in turn actuated by a gearmotor 11.

[0032] The pulley is designated by the reference numeral 12. The axis of motion of the bevel gear pair is parallel to the axis of the hollow shaft 3.

[0033] The hexagonal shaft 10 moves axially in order to engage and disengage the shaft 9 of the bevel gear pair 8. Such axial movement is ensured by an electromagnet 13.

5 **[0034]** The arms 6 and 7 each support a plate, designated by the reference numerals 15 and 14, respectively.

[0035] At least one of the two plates, for example the plate 14, in the initial position is arranged downward and horizontally and can slide freely on a pair of guiding stems 16 so as to be extracted in order to facilitate the loading/unloading of the cans of lacquer. Stroke limiting means 28 allow to lock the lower plate 14 both in the extraction position for loading the can and in the retraction position for removing the can.

15 **[0036]** The upper plate 15 is instead keyed to a pulley 17 which is driven by means of a belt (not shown) by another pulley 18 which is in turn keyed to another shaft 19 which has for example a hexagonal cross-section and to the end of which a bevel pinion 20 is rigidly fixed.

20 **[0037]** The bevel pinion 20 meshes with a fixed bevel gear 21 which is bolted to the flanged sleeve 2.

[0038] The upper plate 15 is fixed to a sliding shaft 24, and a cam 22 is arranged at the opposite end of said shaft 24 with respect to the plate; such cam is designed to excite sensor means 23, conveniently constituted for example by a proximity sensor.

30 **[0039]** Motion is transmitted from the pulley 17 to the plate 15 when, under the action of a compression force, a shaft 25, which is coaxial to the shaft 24 and is rigidly coupled to the pulley 17, presses, together with the shaft 24, against a disk 26 of material having a high friction coefficient, which rigidly couples the two shafts.

35 **[0040]** With reference to the figures, the operation of the agitator apparatus according to the invention is as follows.

[0041] After a can of paint or lacquer has been placed on the plate 14, being extracted along the guides 16, such plate is pushed inside the apparatus.

40 **[0042]** This operation occurs while the guides 4 are in a vertical position. The correct position is determined by a photosensor.

[0043] The hexagonal shaft 10 is inserted in the hexagonal slot of the shaft 9 of the bevel gear pair 8 by virtue of the action of the electromagnet 13.

45 **[0044]** Once it has engaged the shaft 9, the hexagonal shaft 10 starts to turn, actuated by the gearmotor 11, by way of the pulley 12.

50 **[0045]** The motion is transmitted to the bevel gear pair 8, which turns the right and left trapezoidal screw 5, thereby closing or opening the arms 6 and 7. The arms close until the plates 14 and 15, with a symmetrical motion, abut against the opposite end surfaces of the can of lacquer or paint. The upper plate 15, under the compression action, performs a short vertical stroke with respect to its arm 6, so that the cam 22 excites the proximity microswitch 23. The microswitch provides the clearance signal indicating that a can of color is clamped

between the two plates 14 and 15; thereafter, the hexagonal shaft 10 disengages from the shaft 9.

[0046] The hollow shaft 3, actuated by the belt drive, starts to turn and during the rotation the bevel pinion 20 rolls along the fixed bevel gear 21, thus imparting a rotary motion to the hexagonal shaft 19, to the pulley 18 (keyed on the shaft 19) and, by way of a belt, to the pulley 17 and therefore to the upper plate 15 and to the can of lacquer or paint.

[0047] In this manner, the can has two simultaneous rotary motions: one with respect to the horizontal axis of the hollow shaft 3 and one with respect to the longitudinal axis of the can.

[0048] After a preset time has elapsed, the hollow shaft 3 ceases to turn and stops in the initial position again. At this point the shaft 10 again engages the slot of the shaft 9 in order to act on the bevel gear pair 8 and open the plates 14 and 15, so as to allow to remove the can of lacquer or paint, whose content is by then perfectly mixed and amalgamated by the above described rotary motions.

[0049] In this manner, the can of lacquer or paint is turned exclusively in the presence of the clearance signal indicating that the arms 6 and 7, with the corresponding plates 15 and 14, have clamped around the can whose content is to be mixed.

[0050] Moreover, the sliding of the lower plate on the guides 16 allows to perform easy loading/unloading of the can of lacquer or paint to be processed.

[0051] In practice it has been found that the apparatus according to the invention fully achieves the intended aim and objects, since it allows to move the can of lacquer or paint on two mutually perpendicular axes with simultaneous rotary motions in which the rotary motion about the axis of the hollow shaft of the agitator apparatus can be performed only when the arms of the apparatus have abutted against the opposite end surfaces of the can whose content is to be mixed.

[0052] The apparatus thus conceived is susceptible of numerous modifications and variations within the scope of the appended claims; all the details may furthermore be replaced with other technically equivalent elements.

[0053] In practice, the materials used, so long as they are compatible with the specific use, as well as the dimensions, may be any according to requirements and to the state of the art.

[0054] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. An agitator apparatus for mixing lacquers, paints and the like, comprising a supporting frame (1) inside which a sleeve (2) is fixed, said sleeve accommodating a hollow shaft (3) being suitable to transmit a rotary motion, about its own axis, to two arms (6,7) provided with respective plates (14,15) which are suitable to abut against a can which contains lacquer or paint to be mixed; two sliding guides (4) for said arms, arranged so as to be rigidly coupled to said hollow shaft; actuation means for the sliding of said arms along said two guides, which can be actuated when said hollow shaft is not rotating, said actuation means comprising screw means (5) which are arranged parallel to said two guides and are actuated by a bevel gear pair which is in turn actuated by a first shaft (9), **characterized by** a second shaft (10) suitable to engage in said first shaft with an axial movement determined by the action of electromagnet means (13).
2. The apparatus according to claim 1, **characterized in that** said first and second shafts (9,10) are arranged so that their axes are parallel to the axis of said hollow shaft (3), said second shaft being actuated by a gearmotor (11).
3. The apparatus according to claim 2, **characterized in that** it comprises means which are suitable to actuate said arms with a rotary motion about the axis of said can of lacquer or paint clamped between the respective plates of said arms.
4. The apparatus according to claim 3, **characterized in that** said means for actuating the arms with a rotary motion about the axis of said can comprise additional screw means which have, at one end, a bevel pinion (20) suitable to engage a bevel gear (21) which is rigidly coupled to said sleeve (2), a first pulley (18) being rigidly coupled to said additional screw means, a second pulley (17) being rigidly coupled to one of said plates, for the transmission of the rotary motion of said additional screw means from said first pulley to said second pulley, and from said second pulley to said one of said plates.
5. The apparatus according to claim 4 **characterized in that** the plate of said two plates that is suitable to be driven by said additional screw means is fixed to a sliding shaft (24), a cam element (22) being arranged at the opposite end of said shaft with respect to the plate, said cam element being suitable to excite a proximity sensor, an additional shaft being arranged coaxially to said sliding shaft and being suitable to be rigidly coupled to said sliding shaft by interposing a disk made of a material which has a high friction coefficient when said arm is pushed against

the upper surface of said can.

6. The apparatus according to claim 4 or 5 **characterized in that** said first pulley, which is rigidly coupled to said additional screw means, and said second pulley, on which said plate is keyed, are actuated by way of a belt. 5
7. The apparatus according to one or more of the preceding claims, **characterized in that** it comprises at least one motor (27) which is suitable to turn said hollow shaft (3). 10
8. The apparatus according to one or more of the preceding claims, **characterized in that** said screw means (5) comprise a right and left trapezoidal screw. 15
9. The apparatus according to one or more of the preceding claims, **characterized in that** said first shaft of said means for the actuation of the two arms for opening/closure along said screw means has, at the opposite end with respect to the end where said bevel gear pair is provided, a slot allowing the engagement of said second shaft, which is hexagonal. 20 25
10. The apparatus according to one or more of the preceding claims, **characterized in that** said sleeve (2) is provided with a flange having a hole inside which said second shaft can slide freely in order to engage or disengage from said first shaft for the movement of said two arms along said guides. 30

Patentansprüche

1. Mischvorrichtung zum Mischen von Lacken, Farben und dergleichen, umfassend einen Tragrahmen (1), in dem eine Buchse (2) befestigt ist, wobei die Buchse eine Hohlwelle (3) aufnimmt, die zur Übertragung einer Drehbewegung um ihre eigene Achse an zwei Arme (6,7) geeignet ist, welche mit jeweiligen Platten (14, 15) versehen sind, die dazu geeignet sind, gegen eine Dose anzustoßen, welche einen zu mischenden Lack oder eine zu mischende Farbe enthält; zwei Gleitführungen (4) für die Arme, welche so angeordnet sind, dass sie mit der Hohlwelle drehstarr verbunden sind; Antriebsmittel für das Gleiten der Arme entlang der beiden Führungen, welche betätigt werden können, wenn sich die Hohlwelle nicht dreht, wobei die Antriebsmittel Gewindevorrichtungen (5) umfassen, die parallel zu den beiden Führungen angeordnet sind und durch ein Kegelradpaar angetrieben werden, welches wiederum durch eine erste Welle (9) angetrieben wird, **gekennzeichnet durch** eine zweite Welle (10), die dazu geeignet ist, in die erste Welle mit einer axialen Bewegung einzugreifen, welche 40 45 50 55

durch die Wirkung einer Elektromagnet-Vorrichtung (13) bestimmt wird.

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die erste und die zweite Welle (9, 10) so angeordnet sind, dass ihre Achsen parallel zu der Achse der Hohlwelle (3) verlaufen, wobei die zweite Welle durch einen Getriebemotor (11) angetrieben wird.
3. Vorrichtung nach Anspruch 2, **dadurch gekennzeichnet, dass** sie Mittel umfasst, die zum Antrieb der Arme geeignet sind, und zwar mit einer Drehbewegung um die Achse der zwischen die jeweiligen Platten der Arme eingeklemmten Dose mit Lack oder Farbe.
4. Vorrichtung nach Anspruch 3, **dadurch gekennzeichnet, dass** die Mittel zum Antrieb der Arme mit einer Drehbewegung um die Achse der Dose zusätzliche Gewindevorrichtungen umfassen können, die, an einem Ende, ein Kegelritzel (20) aufweisen, welches für den Eingriff in ein fest mit der Buchse (20) verbundenes Kegelrad (21) geeignet ist, sowie eine erste Riemenscheibe (18), die drehstarr mit den zusätzlichen Gewindevorrichtungen verbunden ist, eine zweite Riemenscheibe (17), die drehstarr mit einer der Platten verbunden ist, für die Übertragung der Drehbewegung der zusätzlichen Gewindevorrichtungen von der ersten Riemenscheibe zu der zweiten Riemenscheibe und von der zweiten Riemenscheibe zu der besagten Platte.
5. Vorrichtung nach Anspruch 4, **dadurch gekennzeichnet, dass** diejenige Platte der beiden Platten, welche dazu geeignet ist, durch die zusätzlichen Gewindevorrichtungen angetrieben zu werden, an einer Schiebewelle (24) befestigt ist, wobei ein Nockenelement (22) an dem in Bezug auf die Platte entgegen gesetzten Ende der Welle angeordnet und dieses Nockenelement zur Erregung eines Näherungssensors geeignet ist, und wobei eine zusätzliche Welle koaxial zu der Schiebewelle angeordnet und für die drehstarre Kupplung mit der Schiebewelle geeignet ist, und zwar durch Zwischenschalten einer Scheibe aus einem Material mit einem hohen Reibungskoeffizienten, wenn der Arm gegen die obere Fläche der Dose gedrückt wird. 35 40 45 50
6. Vorrichtung nach Anspruch 4 oder 5, **dadurch gekennzeichnet, dass** die erste Riemenscheibe, welche mit der zusätzlichen Gewindevorrichtung drehstarr verbunden ist, und die zweite Riemenscheibe, auf der die besagte Platte verkeilt ist, durch einen Riemen angetrieben werden.
7. Vorrichtung nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet,**

dass sie wenigstens einen Elektromotor (27) umfasst, der zum Drehen der Hohlwelle (3) geeignet ist.

8. Vorrichtung nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Gewindevorrichtungen (5) eine rechts und links trapezförmige Schraube umfassen.
9. Vorrichtung nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die erste Welle der besagten Mittel für den Antrieb der beiden Arme zum Öffnen/Schließen entlang der Gewindevorrichtungen an dem entgegen gesetzten Ende, in Bezug auf das Ende, an dem das Kegelradpaar vorgesehen ist, eine Nut aufweist, die den Eingriff der zweiten Welle ermöglicht und die hexagonal ist.
10. Vorrichtung nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Buchse (2) mit einem Flansch versehen ist, der eine Öffnung aufweist, in der die zweite Welle frei gleiten kann, um in die erste Welle einzugreifen oder sich von dieser zu lösen, um die Bewegung der beiden Arme entlang der Führungen zu ermöglichen.

Revendications

1. Dispositif d'agitation pour mélanger des laques, des peintures et équivalents, comprenant un cadre de support (1), dans lequel un manchon (2) est fixé, ledit manchon s'adaptant avec un arbre creux (3) apte à transmettre un mouvement rotatif, autour de son propre axe, à deux arbres (6, 7) pourvus de plaques respectives (14, 15) qui sont aptes à venir en contact contre une boîte qui contient la laque ou la peinture devant être mélangée ; deux guides de glissement (4) pour lesdits arbres, arrangés de manière à être rigidement couplés audit arbre creux ; des moyens de mise en marche pour le glissement desdits arbres le long desdits deux guides, qui peuvent être mis en marche quand ledit arbre creux n'est pas en rotation, lesdits moyens de mise en marche comprenant des moyens de vissage (5) qui sont arrangés de manière parallèle auxdits deux guides et sont mis en marche par une paire d'engrenages coniques qui est alternativement mise en marche par un premier arbre (9), **caractérisé par** un second arbre (10) apte à s'engager dans ledit premier arbre avec un mouvement axial déterminé par la force des moyens d'électroaimants (13).
2. Dispositif selon la revendication 1, **caractérisé en ce que** lesdits premier et second arbres (9, 10) sont disposés de manière à ce que leurs axes soient pa-

rallèles à l'axe dudit arbre creux (3), ledit second arbre étant mise en marche par un moteur à engrenage (11).

3. Dispositif selon la revendication 2, **caractérisé en ce qu'il** comporte des moyens qui sont aptes à mettre en marche lesdits arbres avec un mouvement rotatif autour de l'axe de ladite boîte de laque ou de peinture attachée entre les plaques respectives desdits arbres.
4. Dispositif selon la revendication 3, **caractérisé en ce que** lesdits moyens pour la mise en marche des arbres avec un mouvement rotatif autour de l'axe de ladite boîte comportent des moyens de vissage supplémentaires qui ont, à une extrémité, un pignon conique (20) apte à engager un engrenage conique (21) qui est rigidement couplé audit manchon (2), une première poulie (18) étant rigidement couplée auxdits moyens de vissage supplémentaires, une seconde poulie (17) étant rigidement couplée à une desdites plaques, pour la transmission du mouvement rotatif auxdits moyens de vissage supplémentaires à partir de ladite première poulie vers ladite seconde poulie, et à partir de ladite seconde poulie vers ladite une desdites plaques.
5. Dispositif selon la revendication 4, **caractérisé en ce que** la plaque desdites deux plaques qui est apte à être conduite par lesdits moyens de vissage supplémentaires est fixée à un arbre de glissement (24), un élément à came (22) étant disposé à l'extrémité opposée dudit arbre par rapport à la plaque, ledit élément à came étant apte à exciter un capteur de proximité, un arbre supplémentaire étant disposé de manière coaxiale audit arbre de glissement et étant apte à être rigidement couplé audit arbre de glissement en interposant un disque fait d'une substance qui a un fort coefficient de friction quand ledit arbre est poussé contre la surface supérieure de ladite boîte.
6. Dispositif selon l'une des revendications 4 ou 5, **caractérisé en ce que** ladite première poulie, qui est rigidement couplée auxdits moyens de vissage supplémentaires, et ladite seconde poulie, sur laquelle ladite plaque est saisie, sont mises en marche au moyen d'une courroie.
7. Dispositif selon l'une ou plusieurs des revendications précédentes, **caractérisé en ce qu'il** comporte au moins un moteur (27) qui est apte à faire tourner ledit arbre creux (3).
8. Dispositif selon l'une ou plusieurs des revendications précédentes, **caractérisé en ce que** lesdits moyens de vissage (5) comportent une vis trapézoïdale gauche et droite.

9. Dispositif selon l'une ou plusieurs des revendications précédentes, **caractérisé en ce que** ledit premier arbre desdits moyens pour la mise en marche des deux arbres pour l'ouverture / la fermeture le long desdits moyens de vissage a, à l'extrémité opposée par rapport à l'extrémité où ladite paire d'engrenages coniques est prévue, une rainure permettant l'engagement dudit second arbre, qui est hexagonale.
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10. Dispositif selon l'une ou plusieurs des revendications précédentes, **caractérisé en ce que** ledit manchon (2) est pourvu avec un épaulement ayant un orifice dans lequel ledit second arbre peut glisser librement dans le but de s'engager ou de se désengager dudit premier arbre pour le mouvement desdits deux arbres le long desdits guides.
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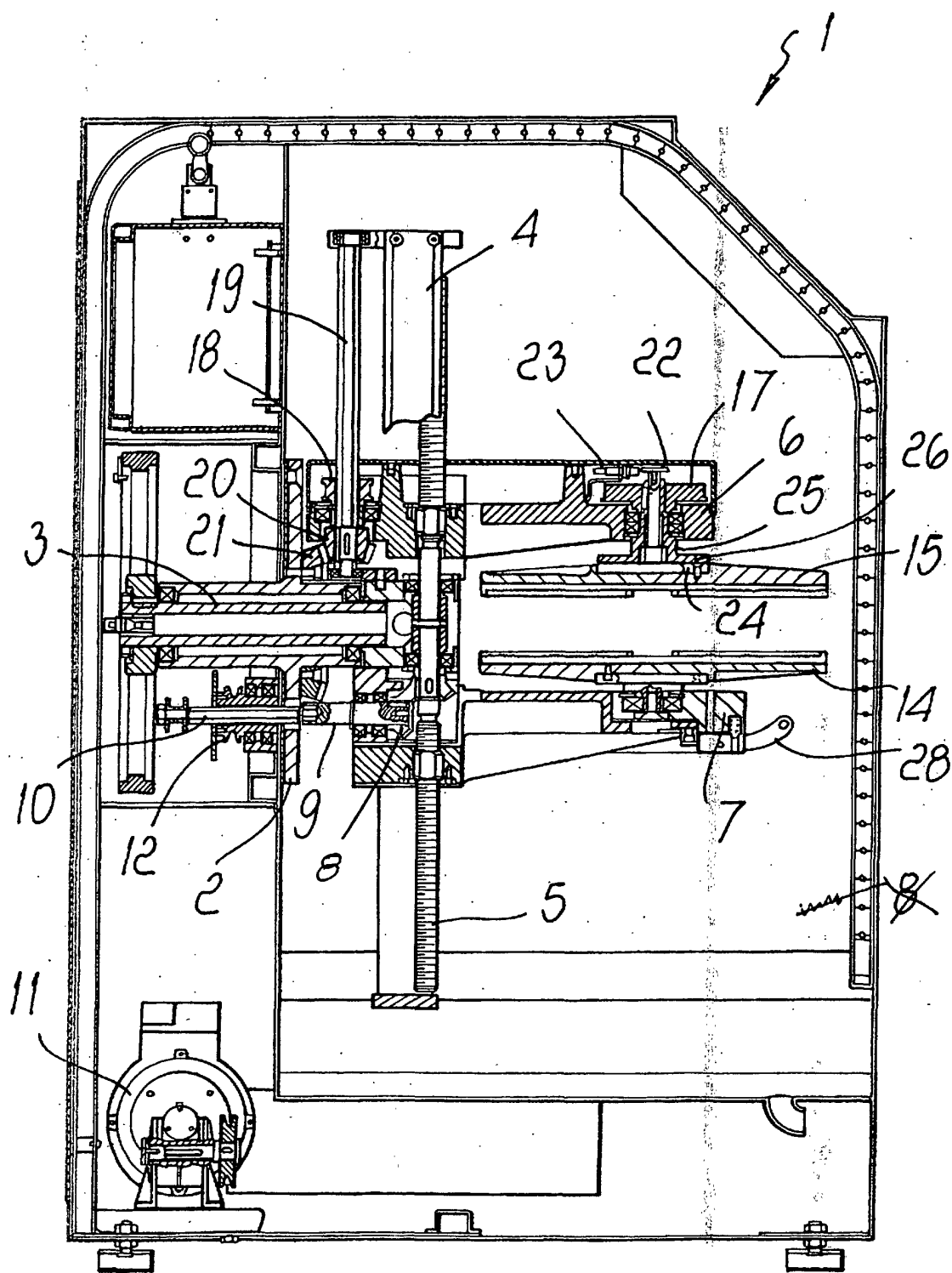


Fig. 1

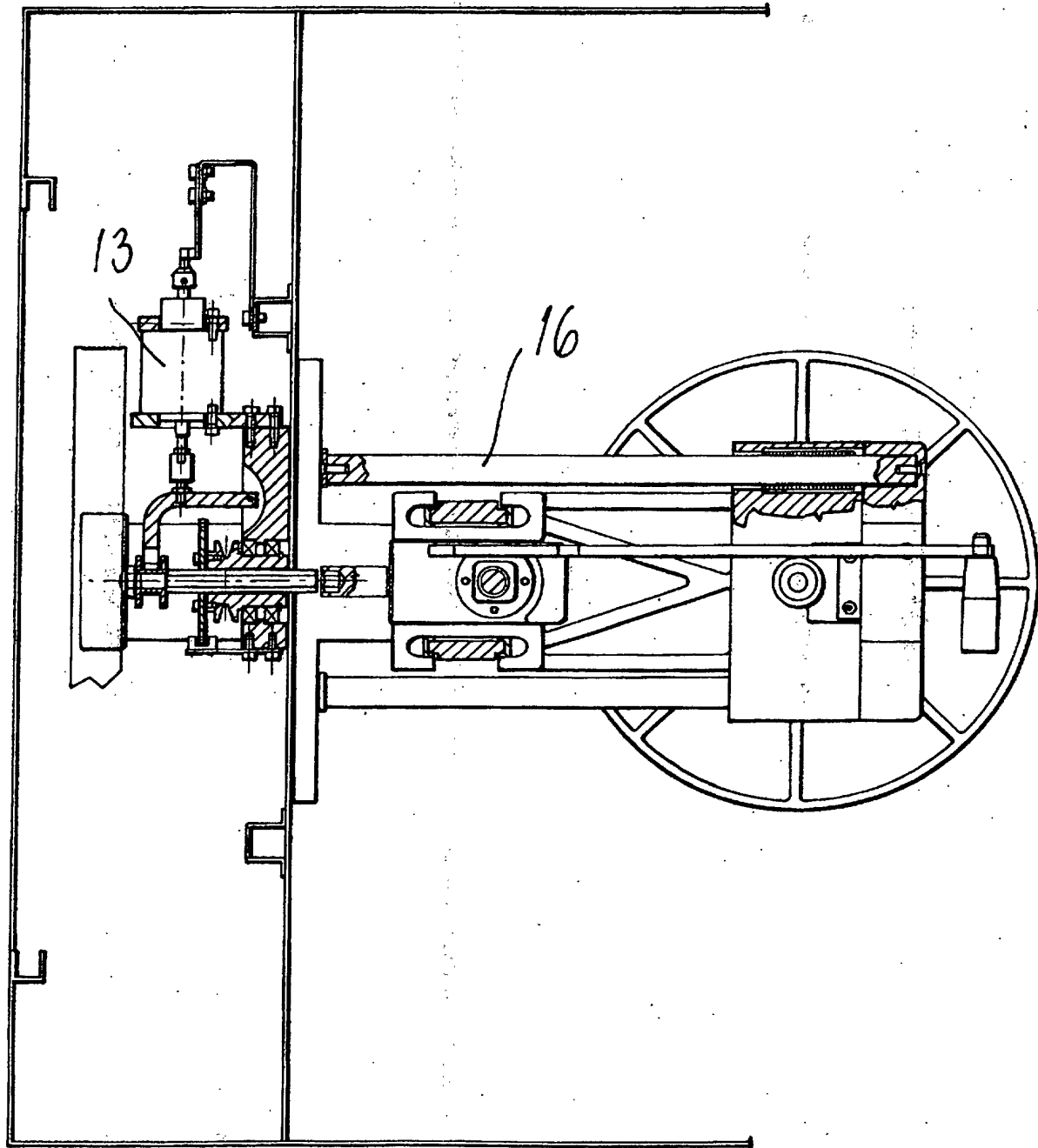


Fig. 2

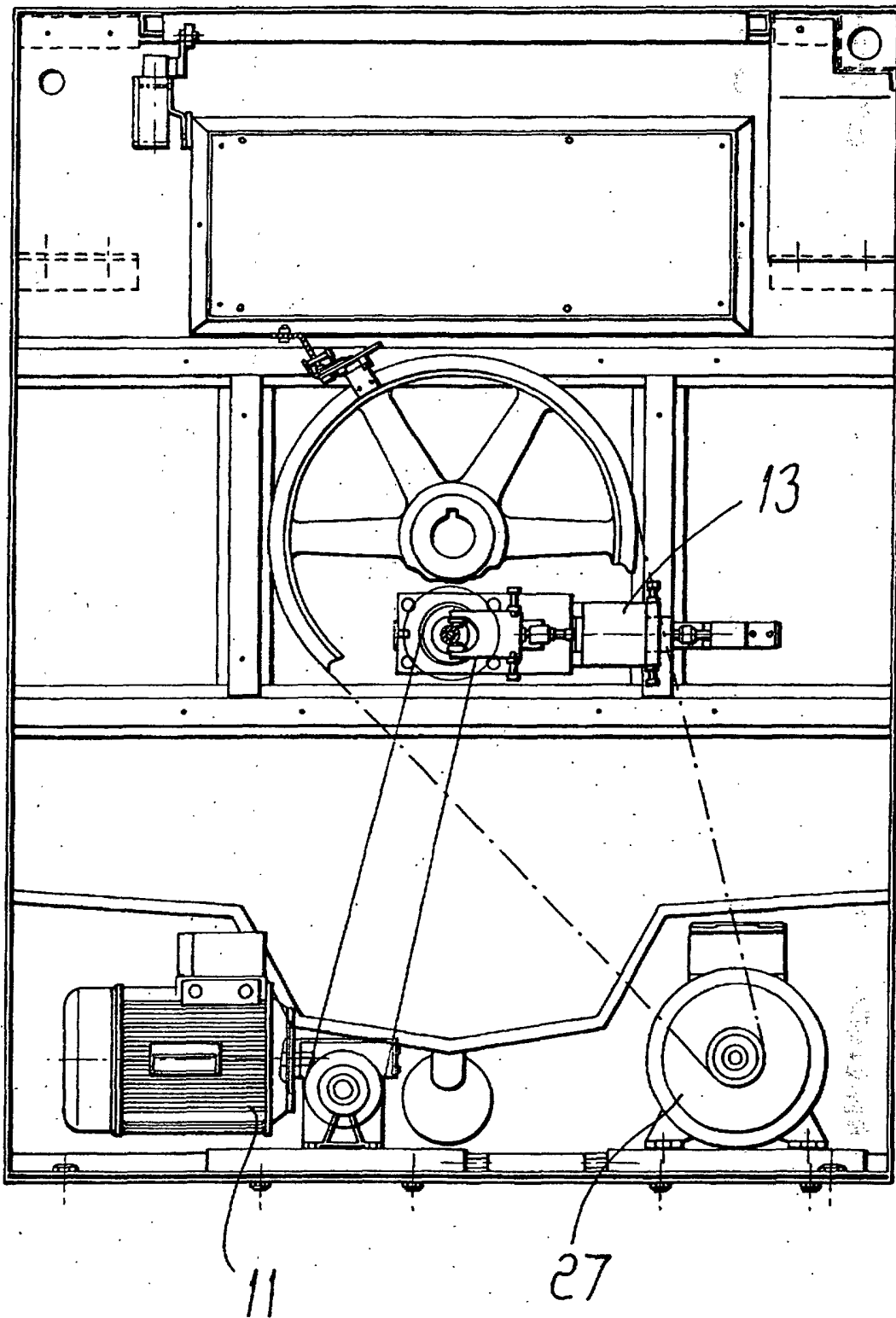


FIG. 3