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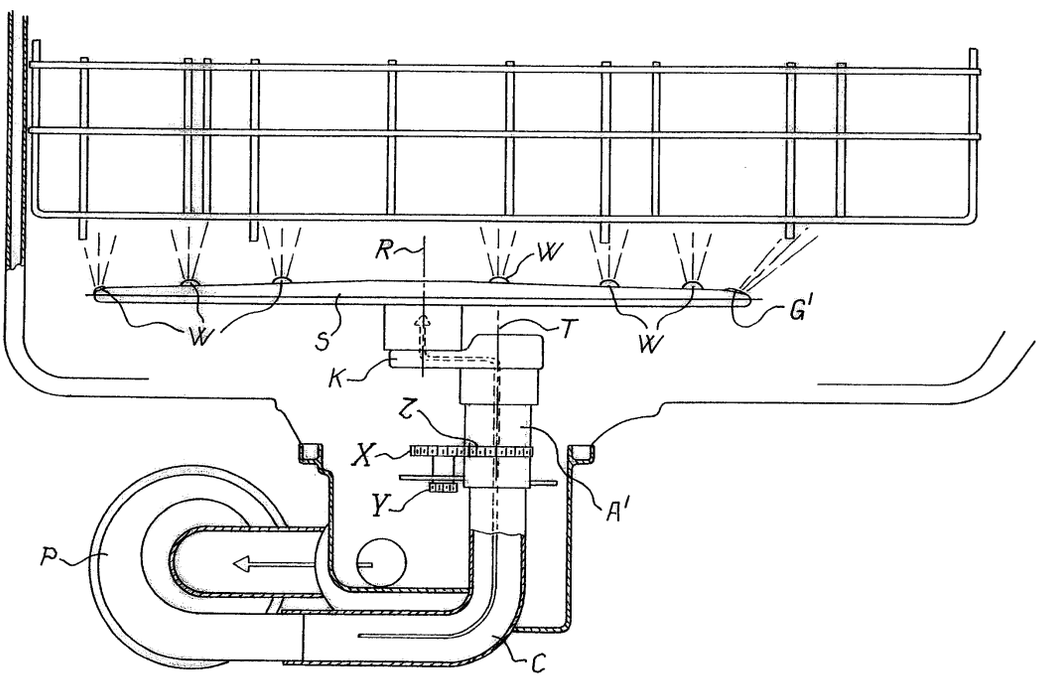
(54) Revolving sprinkling assembly for dishwasher provided with a device for horizontal shift

(57) A revolving sprinkling assembly for dishwasher includes a sprinkler (S) and a device for shifting said sprinkler (S) consisting of a mobile support means for the sprinkler (S) and an actuator means for driving the mobile support means. The latter may consist of a rotating shaft (A') provided at the top with a transverse extension (K) at whose free end there is pivoted the sprinkler (S), so that the axis of rotation (R) of the latter is eccentric with respect to axis of rotation (T) of the shaft (A'), or consist of a translating duct (N) slidably engaged onto a feed box (F). The shifting of the mobile support means is achieved through a toothed rim (Z) or a rack (H) engaged with a gear (X; X') driven into rotation by a thermoactuator or by a motor.

Fig.2



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Description

[0001] The present invention relates to revolving sprinkling assemblies for dishwashers, and in particular to a sprinkling assembly including a device for its shift in the horizontal plane. Reference will be specifically made hereafter to a lower sprinkling assembly operating in a washing space whose width is smaller than its depth, but it is clear that what will be said can also be applied to an upper sprinkling assembly and to a washing space whose width is larger than its depth.

[0002] The revolving sprinklers of known kind essentially consist of a single horizontal sprinkler pivoted on a vertical axis central shaft and provided with at least one propulsion nozzle at one end, as well as with other nozzles arranged along said sprinkler to sprinkle the dishes contained in the dishwasher rack. Since the rotation axis of the sprinkler is fixed, the resulting paths of the nozzles consist of circumferences centered on said axis.

[0003] From this follows that the above-mentioned assembly sprinkles always and only the surfaces of the dishes which are along said circular paths, with a limited washing effectiveness. Moreover, the area which can be reached by the water ejected from the nozzles approximately corresponds to the area of the square circumscribed about the circular path of the outermost nozzle.

[0004] The first aspect of the problem has already been dealt with and effectively solved by the applicant through a revolving sprinkling assembly of orbital type such as that disclosed in Italian patent n.1.263.057 to which reference is made for further details. Said orbital sprinkler covers a much greater surface of the dishes thanks to the combination of the motion of a lower revolving sprinkler with that of at least another upper revolving sprinkler mounted in an eccentric position on the lower one, yet retaining the same overall dimension of a conventional sprinkler.

[0005] However, this effective solution does not allow to reach an area greater than the above-mentioned one, i.e. it can be usefully applied only in the case of a dishwasher whose washing space has a substantially square plan. But in case the sprinkler operates in a rectangular washing space, there is the problem of properly sprinkling also the dishes located at the ends of the rack, i.e. outside the area swept by the sprinkler during its rotation.

[0006] To this purpose the simplest solution is that of giving a greater inclination to the end nozzles of the sprinkler so that the water jets ejected therefrom reach beyond the area of rotation. For example, in fig.1 relating to a known solution of this kind there is illustrated a sprinkler with a nozzle inclined at about 75° so as to cover also the foremost portion of the rack in a dishwasher whose width is smaller than its length (typically 45 x 60 cm).

[0007] This solution has a first drawback of poor washing effectiveness in the end portion of the rack, since very inclined jets are unable to properly enter between the dishes arranged side by side like the almost vertical jets ejected by the other nozzles can do. Moreover, a second drawback stems from the fact that such inclined jets hit the walls of the washing space with a considerable horizontal component thus causing a significant noisiness of the dishwasher.

[0008] In order to overcome these drawbacks the applicant has already devised sprinkling assemblies wherein the sprinkler is centrally pivoted on a vertical shaft located at the end of a support arm through which pressurized water is fed, said support arm being in turn vertically pivoted at its other end. In this way, the propulsion end nozzles of the sprinkler not only cause a revolving motion of the sprinkler but also a horizontal reciprocating motion of the support arm limited by a pair of stops. For further details reference is made to Italian patents n.1.275.155 and n.1.275.156 which respectively relate to an upper single sprinkler and a lower double sprinkler of orbital type.

[0009] Such a solution greatly enhances the washing effectiveness but still retains a certain noisiness in that the support arm hits the end stops at the end of each travel. Moreover, in this type of structure the revolving and reciprocating motions of the sprinkler are mutually bound, i.e. when the sprinkler rotates it must also reciprocate. Therefore it is not possible to keep the sprinkler located at a forward or back position if you wish to carry out a more thorough washing of a certain portion of dishes (e.g. the pots).

[0010] Therefore, the object of the present invention is to provide a revolving sprinkling assembly which overcomes the above-mentioned limitations of prior art sprinklers.

[0011] This object is achieved by means of a sprinkling assembly including a device which allows to shift in the horizontal plane its axis of rotation. Other advantageous features are disclosed in the depending claims.

[0012] The main advantage of the sprinkling assembly according to the present invention is the combination of silent operation and capacity of properly sprinkling also the outermost dishes when these are arranged in a rectangular rack, so as to achieve a high washing effectiveness.

[0013] A further advantage of the present sprinkler is given by the possibility of programming the shift of the sprinkler at any time during the washing cycle, so as to favour the sprinkling of some areas of the rack depending on the number, kind and arrangement of the dishes.

[0014] These and other advantages and characteristics of the sprinkling assembly according to the present invention will be clear to those skilled in the art from the following detailed description of two embodiments thereof, with reference to the annexed drawings wherein:

Fig.1 is a diagrammatic sectional side view of a conventional sprinkling assembly;

Fig.2 is a diagrammatic sectional side view of a first embodiment of a sprinkling assembly according to the invention, the sprinkler being located at a back position;
Fig.3 is a diagrammatic top plan view of the sprinkling assembly of fig.2;
Fig.4 is a diagrammatic sectional side view of the sprinkling assembly of fig.2 shifted to a forward position;
Fig.5 is a diagrammatic top plan view of the sprinkling assembly of fig.4;
Fig.6 is a diagrammatic sectional front view of a second embodiment of a sprinkling assembly according to the invention;
Fig.7 is a diagrammatic top plan view of the sprinkling assembly of fig.6, the sprinkler being located at a back position; and
Fig.8 is a diagrammatic top plan view of the sprinkling assembly of fig.6, the sprinkler being located at a forward position.

[0015] With reference to fig.1, there is seen that a conventional sprinkling assembly includes a sprinkler S rotating in the horizontal plane around an axis of rotation R since it is pivoted onto a vertical hollow shaft A. The rotation of sprinkler S is achieved through at least one propulsion nozzle G arranged at its end and inclined (at 75° in the illustrated example) so as to eject a jet with a horizontal component, whereas the other washing nozzles W eject substantially vertical nozzles to sprinkle the dishes. The pressurized water from the washing pump P reaches sprinkler S through a feed duct C connected to shaft A.

[0016] In figs.2 and 3 there is now illustrated a first embodiment of the sprinkling assembly according to the invention. A comparison between said figures and fig. 1 shows that sprinkler S still rotates around an axis R whose position is unchanged, but now said axis no longer coincides with axis T of the shaft A' on which sprinkler S is mounted. In practice, shaft A' has an upper transverse extension K at whose free end there is pivoted sprinkler S, while duct C is slightly longer to take into account the greater distance between the feed of pump P and shaft A'.

[0017] A toothed rim Z is externally formed at the base of shaft A' and is engaged with a first gear X keyed onto a vertical spindle at whose opposite end there is keyed a second smaller gear Y. Said gear Y is in turn engaged with a rack **E** whose translation is controlled by a thermoactuator M (fig.3).

[0018] Thanks to the above-described shifting device and structure, sprinkler S can be shifted from the back position of figs.2 and 3 to the forward position illustrated in figs.4 and 5. In practice, when the thermoactuator M is powered it provides the extension of rack E and therefore the counter-clockwise rotation (as seen in figs.3 and 5) of gear Y and gear X integral therewith, which corresponds to a clockwise rotation or toothed rim Z. As a consequence, shaft A' rotates through 180° taking extension K in the forward position (fig.4) and the axis of rotation R of sprinkler S thus results shifted forward by a distance equal to twice its eccentricity with respect to axis T of shaft A'.

[0019] During the rotation of shaft A', sprinkler S may even be stopped by temporarily switching off pump P so that it does not hit the sidewalls of the washing space. As an alternative, sprinkler S may be provided at its ends with bumpers suitable to deaden the impact with the walls and after having stopped due to the impact it will immediately start again because of the push of the propulsion nozzle G'.

[0020] In this regard it should be noted that in the forward position sprinkler S reaches close to the front edge of the rack and therefore may be provided with an end propulsion nozzle G' less inclined (45° in the illustrated example) which is therefore more effective in washing the overlying dishes.

[0021] To return sprinkler S to the back position it is sufficient to disconnect the power to thermoactuator M, which under the action of an internal return spring will pull back rack E thus causing a rotation which is reverse of the previously described one. Therefore it is clear that the back or forward position of sprinkler S can be changed at any time during the washing cycle simply by switching on or off thermoactuator M.

[0022] Figures 6 to 8 illustrate a second embodiment wherein the shifting of the axis of rotation R is achieved through a linear translation rather than by rotation as in the above-described arrangement.

[0023] In this case, sprinkler S is pivoted onto a translating duct N which in turn is slidably engaged onto a feed box F, the water reaching sprinkler S through said members which are hollow. A rack H is formed on one side of duct N along the direction of translation, and is engaged with a gear X' driven by a motor V through a reduction gear.

[0024] When motor V is activated gear X' is set into rotation and through rack E provides the translation of duct N, and therefore of sprinkler S mounted thereon, from the back position of fig.7 to the forward position of fig. 8, while the reverse motion is achieved simply by inverting the rotation of motor V.

[0025] This second type of shifting device takes more room than the preceding one, but by providing a linear translation of sprinkler S it prevents possible contacts thereof with the sidewalls of the washing space and allows the operation thereof at any intermediate position along the travel defined by the length of rack E.

[0026] It is clear that the above-described and illustrated embodiments of the sprinkling assembly according to the invention are just examples susceptible of various modifications. In particular, the use of thermoactuator M and motor V are just examples of other possible actuating devices suitable to control the horizontal shift of sprinkler S. Furthermore, it is clear that sprinkler S can be of any type, in particular also of the orbital type,

and that its shifting may be achieved through other mechanisms equivalent to the above-described gears, e.g. levers or the like.

Claims

1. A sprinkling assembly for dishwasher including at least a sprinkler (S) rotating in the horizontal plane around an axis of rotation (R), characterized in that it further includes a device for shifting said sprinkler (S), which device consists of mobile support means for the sprinkler (S) and at least an actuator means for driving said mobile support means.

2. A sprinkling assembly according to claim 1, characterized in that the mobile support means consist of a rotating shaft (A') provided at the top with a transverse extension (K) at whose free end there is pivoted the sprinkler (S), so that the axis of rotation (R) of the latter is eccentric with respect to axis of rotation (T) of the shaft (A').

3. A sprinkling assembly according to claim 2, characterized in that a toothed rim (Z) is externally formed at the base of the shaft (A').

4. A sprinkling assembly according to claim 3, characterized in that the toothed rim (Z) is engaged with a first gear (X) keyed onto a vertical spindle at whose opposite end there is keyed a second gear (Y) which in turn is engaged with a rack (E) whose translation is controlled by a thermoactuator (M).

5. A sprinkling assembly according to claim 3, characterized in that the toothed rim (Z) is engaged with a gear (X') keyed onto a vertical spindle driven into rotation by a motor (V) through a reduction gear.

6. A sprinkling assembly according to claim 1, characterized in that the mobile support means consist of a translating duct (N) slidably engaged onto a feed box (F).

7. A sprinkling assembly according to claim 6, characterized in that a rack (H) is formed on one side of the translating duct (N) along the direction of translation.

8. A sprinkling assembly according to claim 7, characterized in that the rack (H) is engaged with a gear (X') driven by a motor (V) through a reduction gear.

9. A sprinkling assembly according to claim 7, characterized in that the rack (H) is engaged with a first gear (X) keyed onto a vertical spindle at whose opposite end there is keyed a second gear (Y) which in turn is engaged with a rack (E) whose translation is controlled by a thermoactuator (M).

10. A dishwasher with a rectangular washing space, characterized in that it includes a sprinkling assembly according to one or more of the preceding claims.

Fig.1

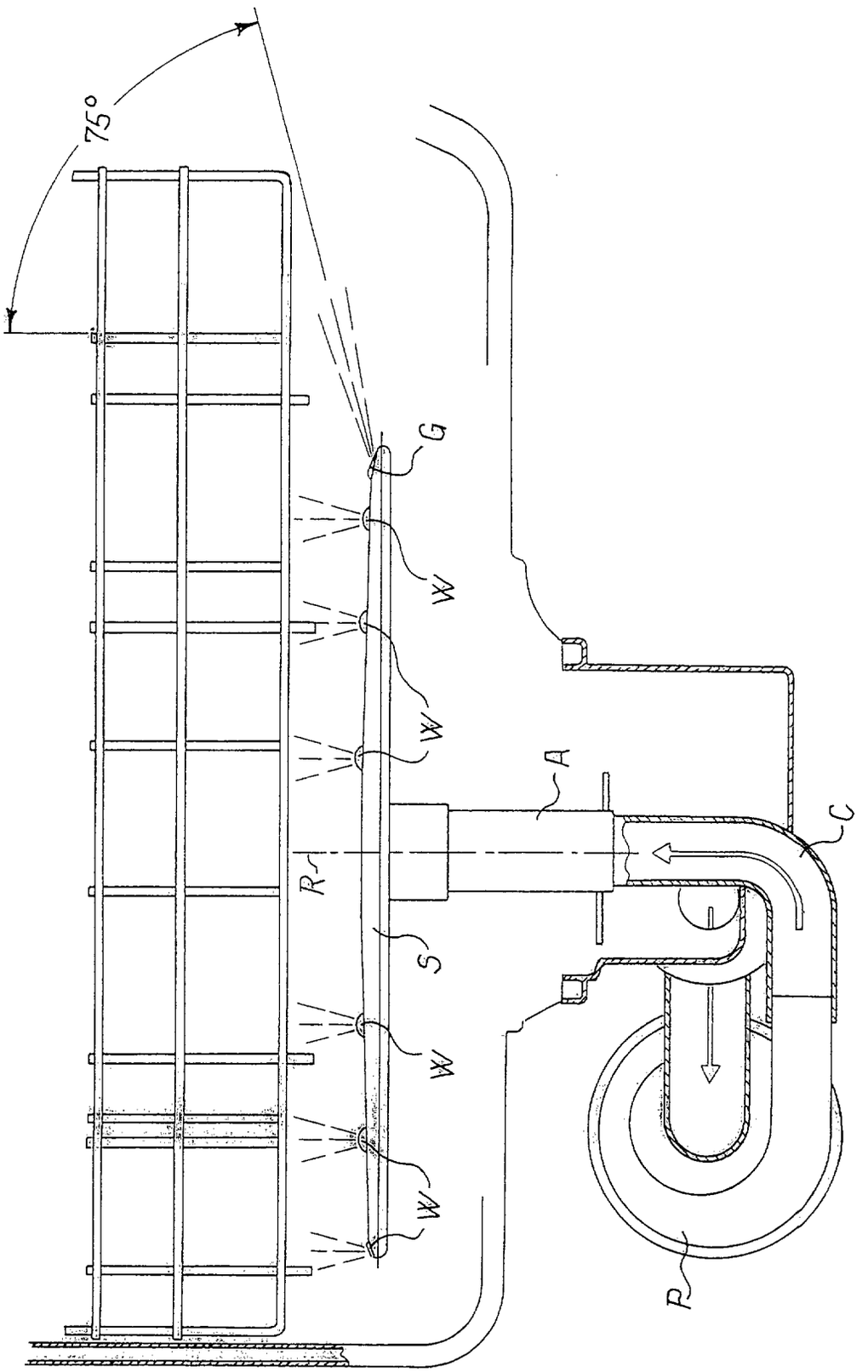


Fig. 2

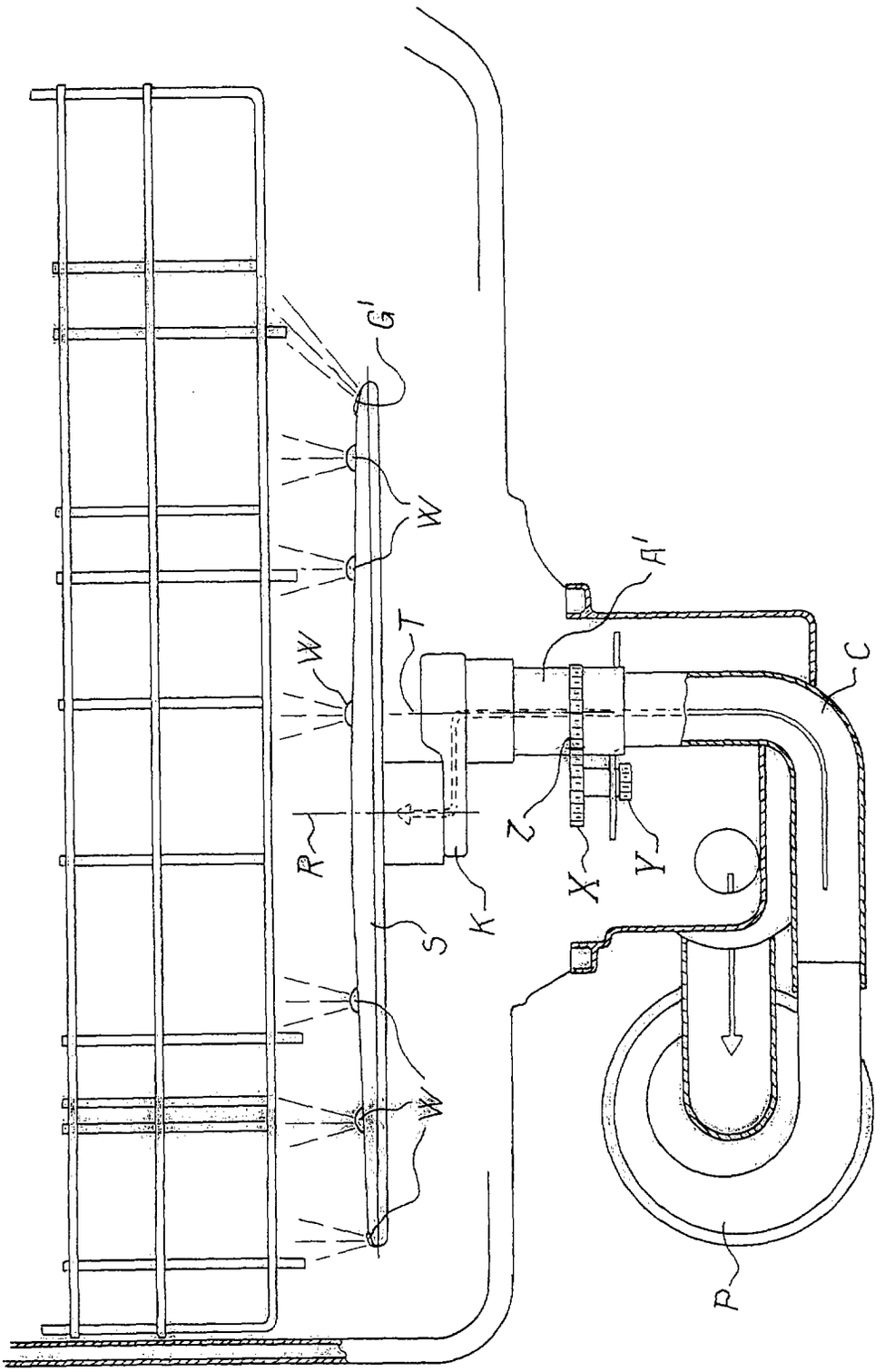
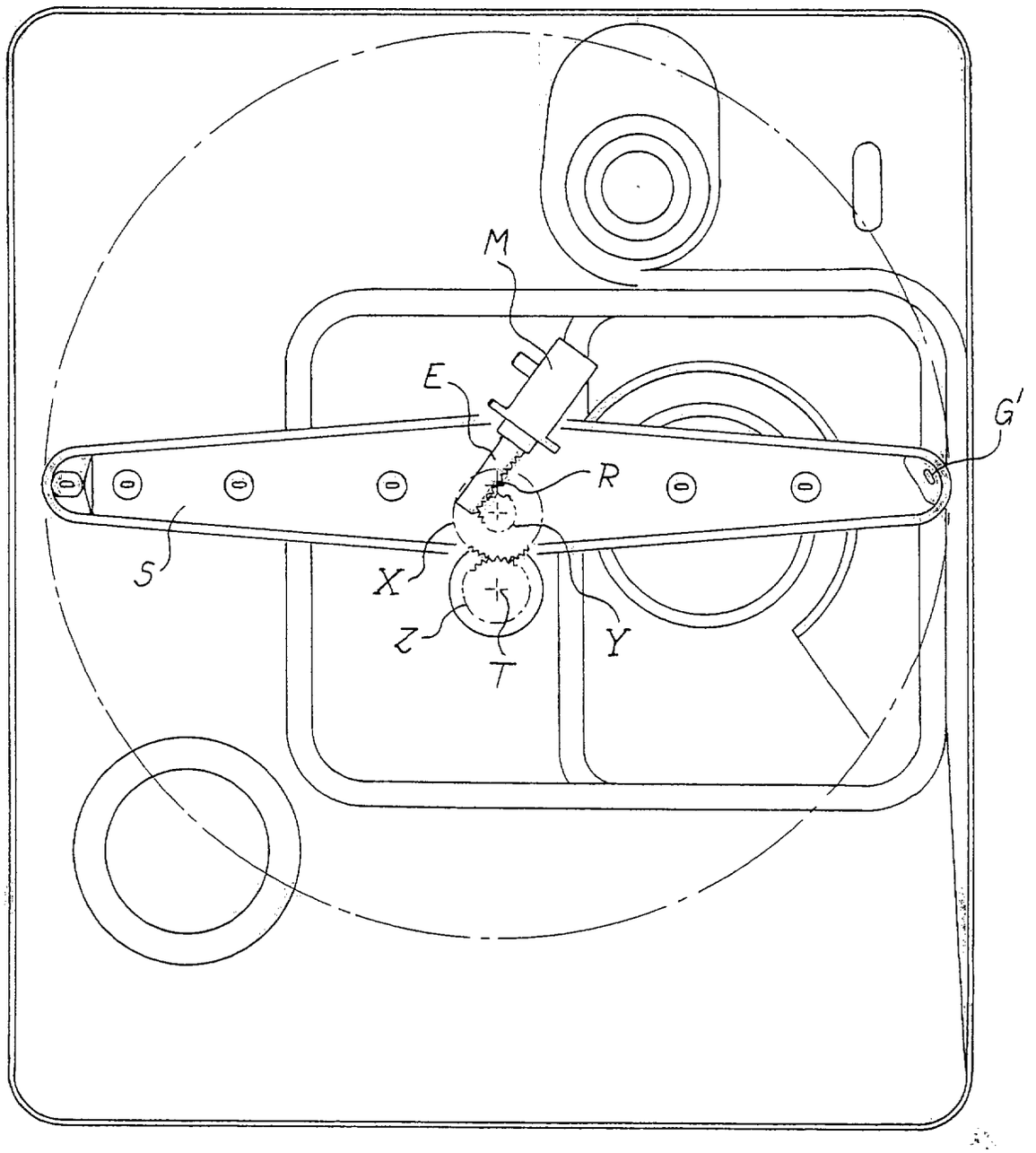


Fig.3



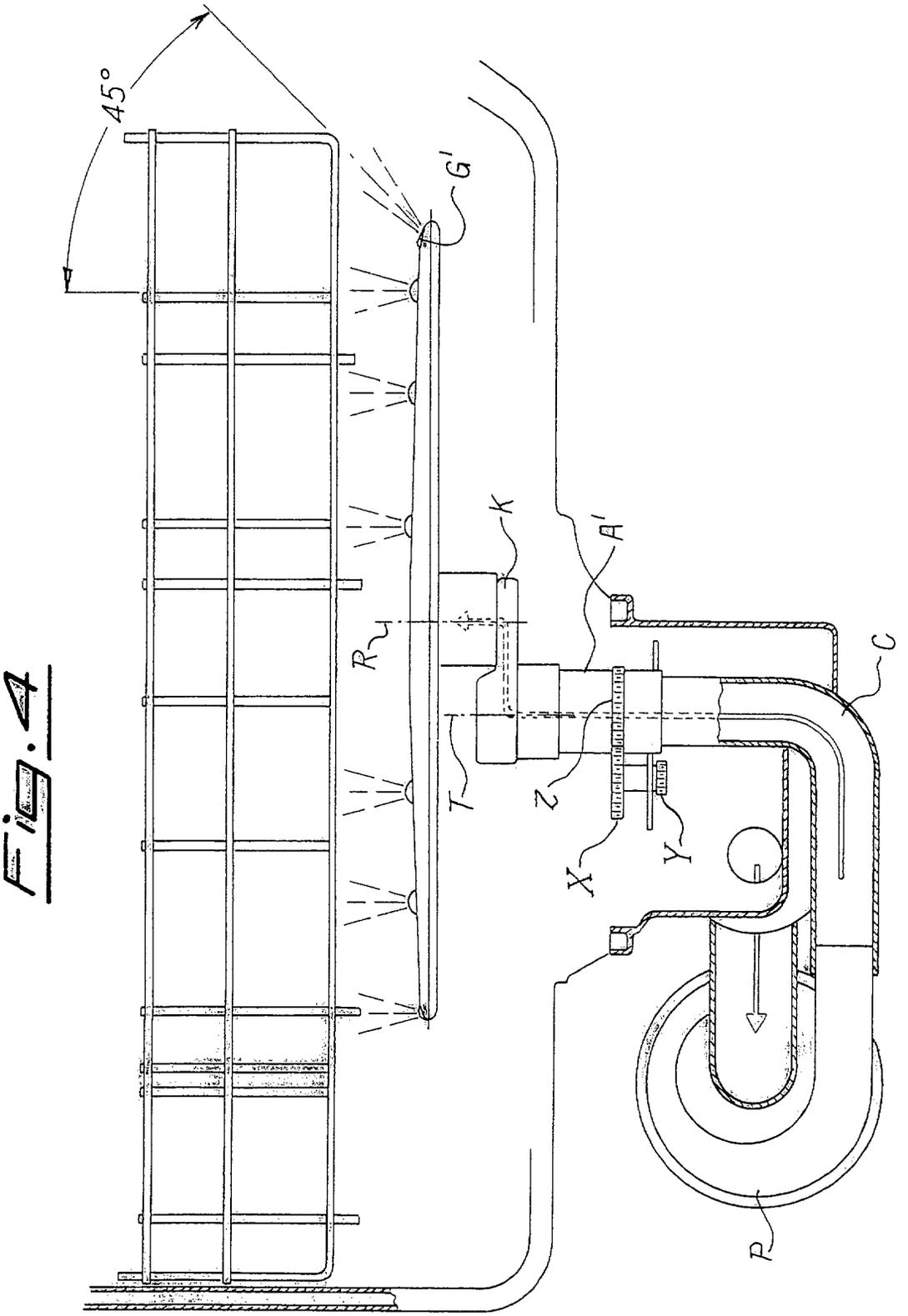
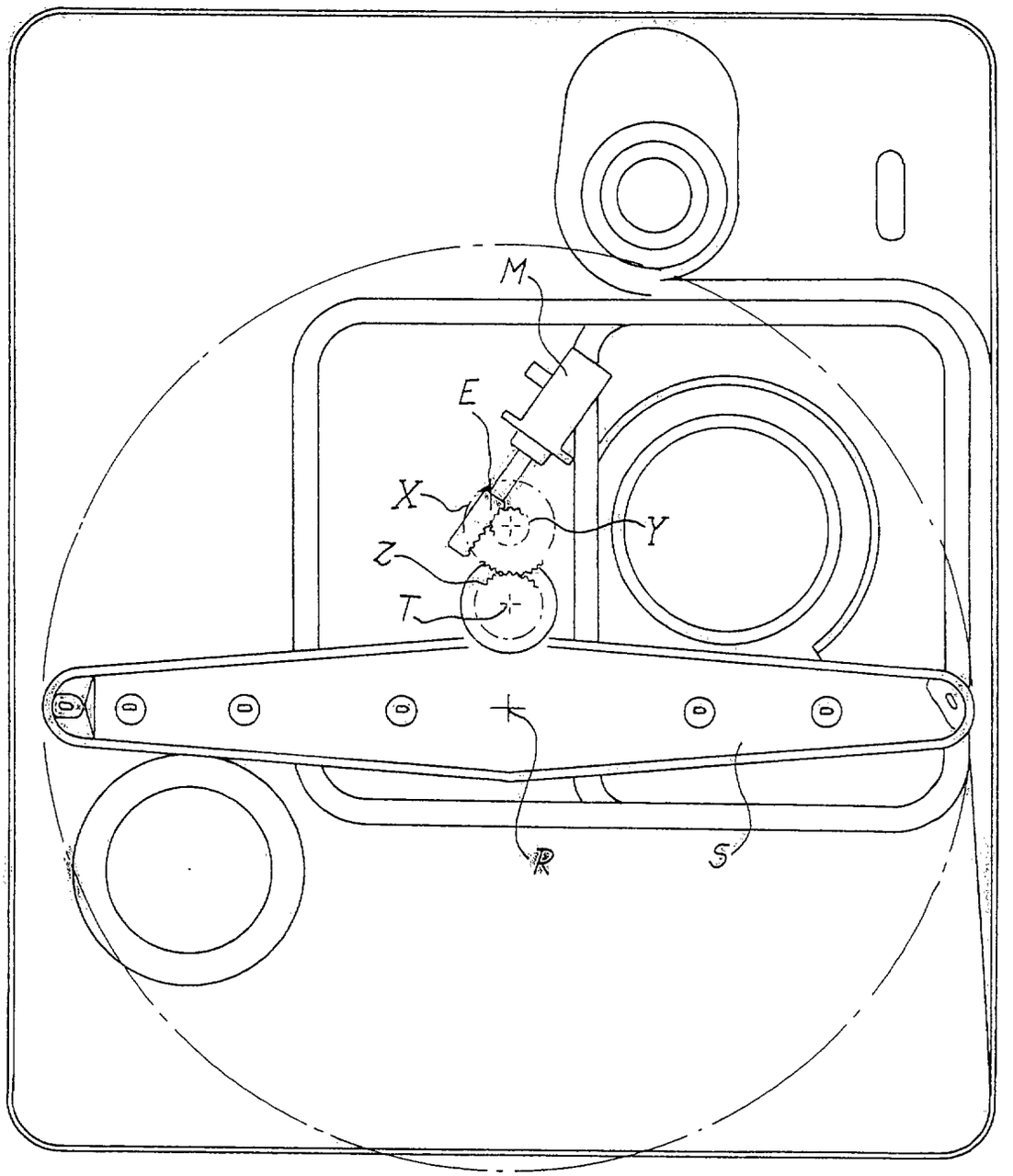


Fig. 4

Fig. 5



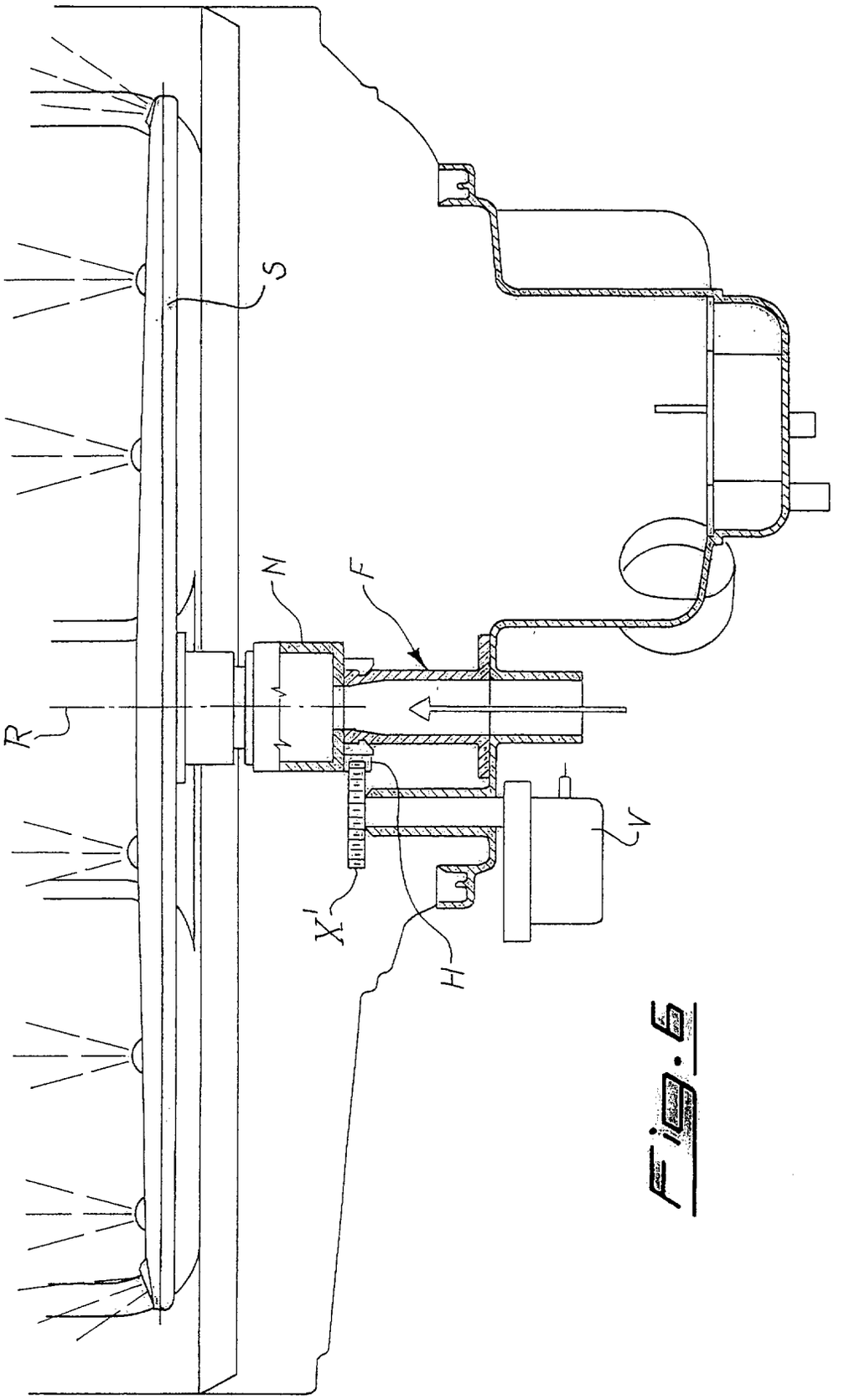


Fig. 6

Fig.7

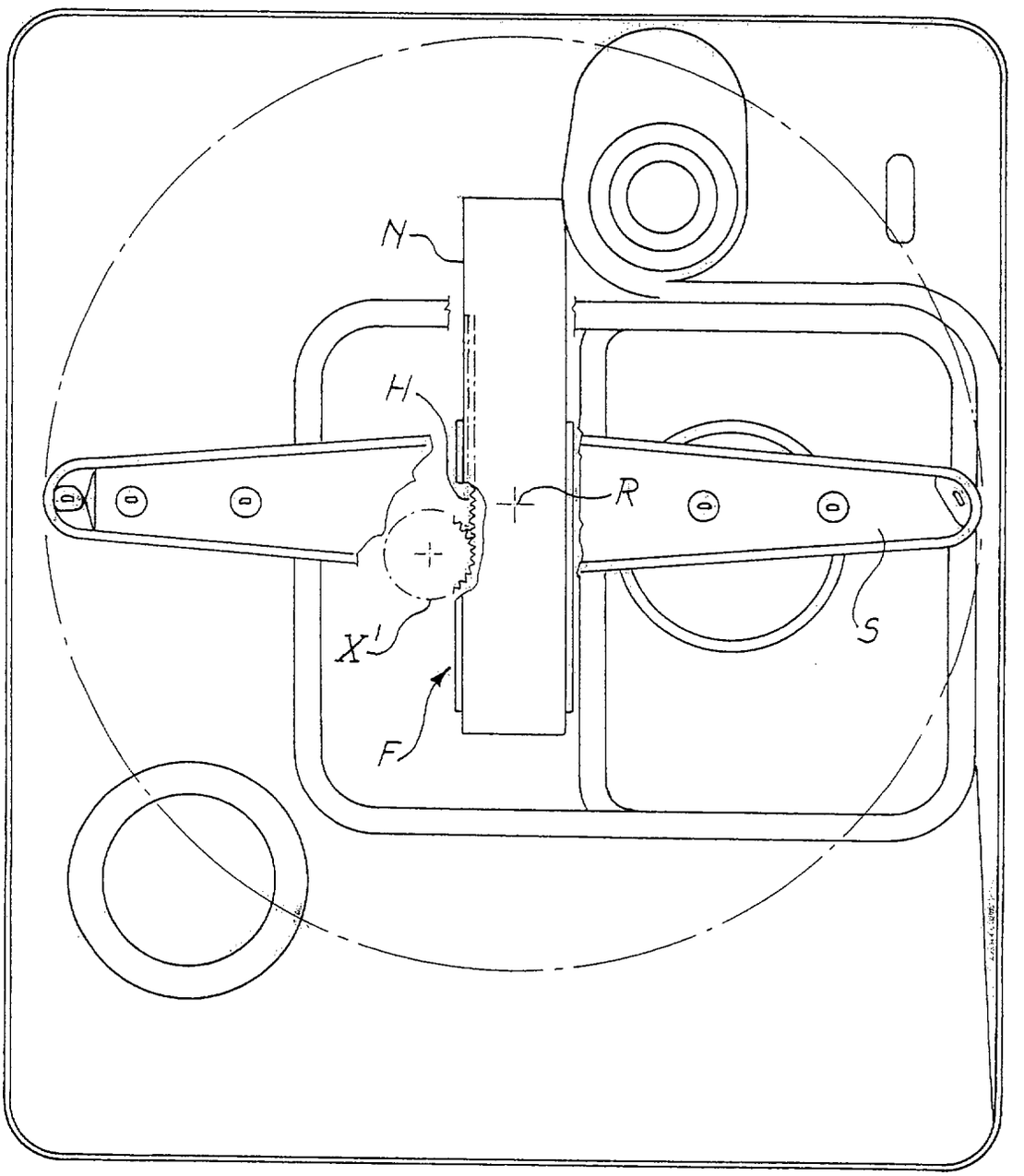
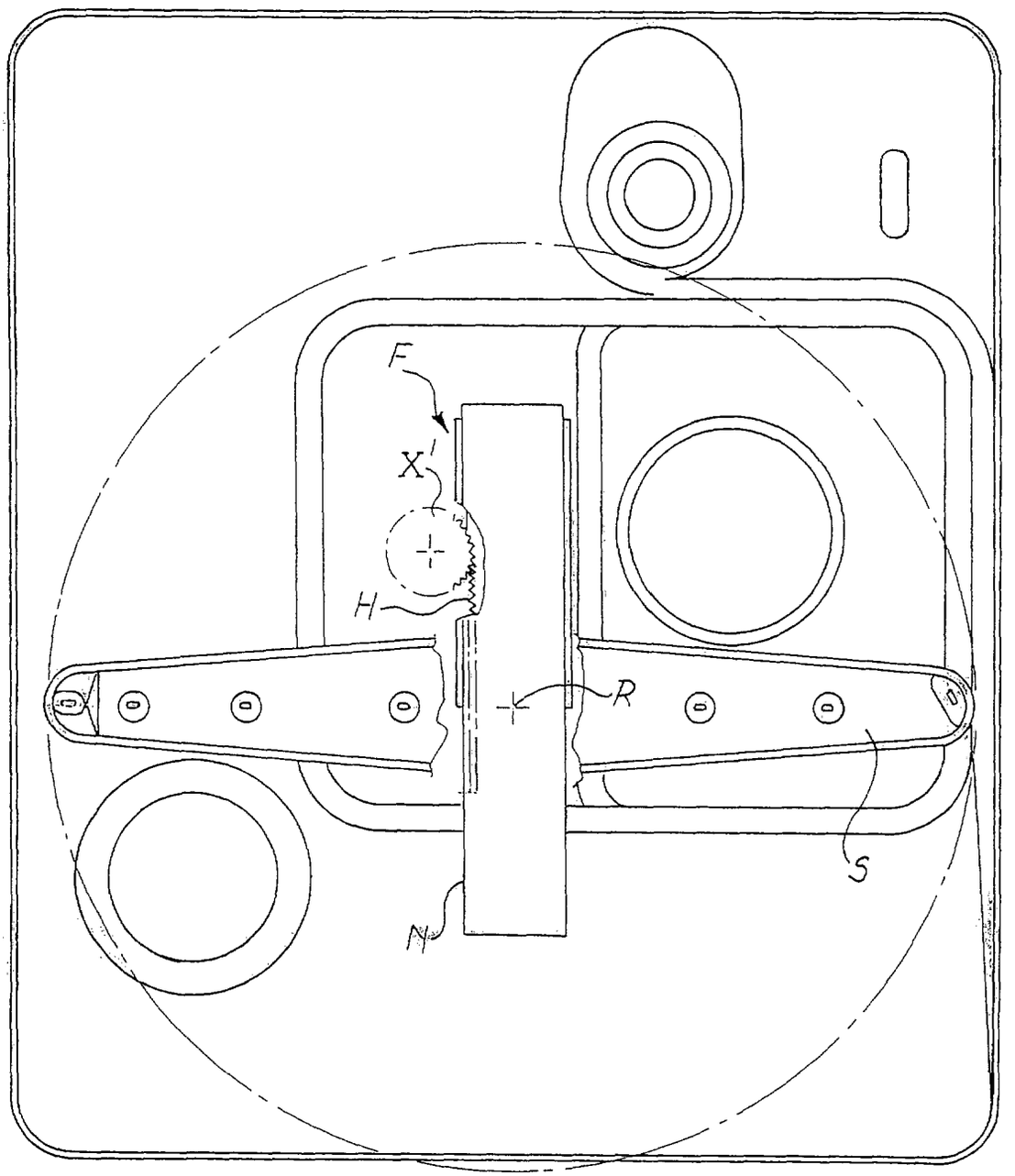


Fig.8



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EUROPEAN SEARCH REPORT

Application Number
EP 00 83 0641

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
D,X	EP 0 727 176 A (SMEG SPA) 21 August 1996 (1996-08-21) & IT-1275155 * page 2, column 2, line 20 - page 3, column 3, line 7 * * figures 1,2 *	1,10	A47L15/22
X	GB 833 434 A (SVEN GUSTAF NORD) * page 1, line 41 - line 54 * * page 1, line 88 - page 2, line 55 * * page 2, line 87 - page 3, line 19 * * figures 1,6-8 *	1,10	
D,A	EP 0 727 177 A (SMEG SPA) 21 August 1996 (1996-08-21) & IT-1275156 * figures 1-3 *	1	
A	US 5 464 482 A (DARYL A. MICHAEL E TAL.) 7 November 1995 (1995-11-07)		

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	8 February 2001	Fairbanks, S

CATEGORY OF CITED DOCUMENTS

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