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(11)

EP 1 132 039 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
12.09.2001 Bulletin 2001/37

(51) Int Cl.7: **A47L 15/20, A47L 15/18**

(21) Application number: **01830145.7**

(22) Date of filing: **01.03.2001**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR**
Designated Extension States:
AL LT LV MK RO SI

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(30) Priority: **08.03.2000 IT MI000460**

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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) pivoted at an end of a horizontal duct (C) which is in turn vertically pivoted at its other end to a hollow shaft (A), as well as a device suitable to pro-

duce an oscillation of said duct (C) around the axis (X) of said shaft (A) with a mechanism which limits the extent of said oscillation, and at least an actuator means (M) for driving said mechanism.

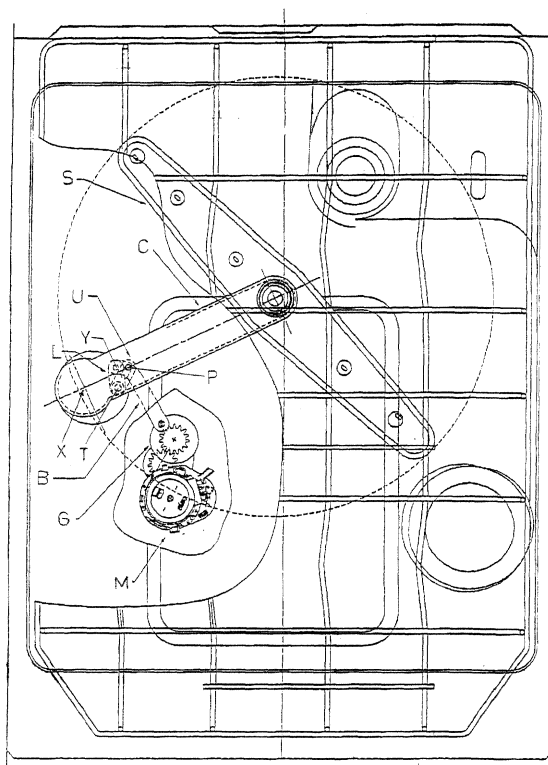


Fig. 1

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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] It is known that conventional revolving sprinkling assemblies essentially consist of a 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 directly 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 a known solution of this kind the sprinkler is provided 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 having the characteristics disclosed in claim 1. Other advantageous features are disclosed in the dependent 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 greater surface directly sprinkled by the jets ejected from the nozzles, thanks to the combination of the revolving motion with the reciprocating motion. In this way, in fact, the nozzle paths have a much more complex development.

[0014] Still another advantage of the present sprinkler is given by the possibility of stopping 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.

[0015] 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 some embodiments thereof, with reference to the annexed drawings wherein:

Fig.1 is a diagrammatic top plan view of a first embodiment of a sprinkling assembly according to the invention, the sprinkler being located at a back position;

Fig.2 is a diagrammatic top plan view of the sprinkling assembly of fig. 1, the sprinkler being located at a forward position;

Fig.3 is a diagrammatic partial sectional side view of the sprinkling assembly of fig.1;

Fig.4 is a diagrammatic sectional top plan view of a second embodiment of a sprinkling assembly according to the invention, the sprinkler being located at a back position;

Fig.5 is a diagrammatic top plan view of the sprinkling assembly of fig.4, the sprinkler being located at a forward position;

Fig.6 is a diagrammatic sectional side view of the sprinkling assembly of fig.4;

Fig.7 is a diagrammatic sectional top plan view of a third embodiment of a sprinkling assembly according to the invention, the sprinkler being located at a back position; and

Fig.8 is a diagrammatic top plan view of the sprinkling assembly of fig.7, the sprinkler being located at a forward position.

[0016] With reference to figs. 1-3, there is seen that a first embodiment of the sprinkling assembly according to the invention includes a sprinkler S rotating in the horizontal plane around an axis of rotation R since it is pivoted at the free end of a horizontal duct C which at its other end is pivoted onto a vertical hollow shaft A. The rotation of sprinkler S is achieved through a conventional propulsion nozzle thanks to the pressurized water coming from a washing pump, the water reaching sprinkler S through shaft A and the horizontal duct C connected thereto.

[0017] The shift of sprinkler S between the back position of fig. 1 and the forward position of fig.2 is obtained by oscillating duct C around axis X of shaft A. This shift is achieved by means of a crank mechanism consisting of a gear G on which there is pivoted a connecting rod B (both not illustrated in fig.3) which at its other end is pivoted through a pin Y onto a lower lever L. Lever L is keyed onto a vertical spindle T which transmits the motion thereof to an upper lever U provided with a slot in which there is engaged a peg P integrally formed on the lower side of duct C.

[0018] In this way, the rotation of gear G (which acts as a crank) causes the reciprocation of connecting rod B, which in turn transmits said reciprocating motion to duct C through pin Y, lower lever L, spindle T, upper lever U and peg P.

[0019] It is also possible to provide a frictional en-

gagement between the lower and upper levers L and U in order to achieve a safety system suitable to prevent damage in case the motion of duct C is blocked by a foreign body (e.g. a piece of cutlery, the handle of a pan) fallen on the bottom of the washing space. Such an engagement can be achieved, for example, by transversely dividing spindle T into two portions kept in contact by the push of a spring. In this way, if duct C is blocked the push of connecting rod B overcomes the spring strength and causes the sliding between the two portions of spindle T, the upper portion standing still and the lower portion rotating, and once the obstacle has been removed the motion of duct C can be restored without any problem.

[0020] The actuator which drives the rotation of gear G may be typically a motor reducer M, as illustrated in figures 1 and 2, but other types of actuators can also be used. For example, motor reducer M could be replaced by a small turbine exploiting the passage of water coming from the washing pump to drive the rotation of gear G. Such a passage may also be controlled by a suitable valve acting as an operating switch for the oscillatory motion of sprinkler S.

[0021] In figures 4 to 6 there is illustrated a second embodiment wherein the shift of the sprinkler is achieved by means of an actuator formed on the mobile portion of the sprinkling assembly rather than external thereto as in the arrangement described above.

[0022] In this case the crank mechanism is reversed, in that the connecting rod B' is pivoted between a pin E integral with the washing space and a crank consisting of the proximal gear of a train of gearing R arranged on the upper side of duct C. The crank motion is provided, through gearings R with a suitable transmission ratio, by the sprinklers itself which acts as actuator by means of an external toothed rim V (fig.6) formed at its base.

[0023] This second type of shifting device has a lower bulkiness and cost with respect to the previous one, but it does not allow to separate the revolving motion of the sprinkler from the oscillatory motion. However, since no hits against end stops occur, its operation is more noiseless and homogeneous with respect to the arrangements cited in the introductory portion of the present application. Furthermore, this device does not require a safety system in that there is no separate actuator but the sprinkler itself stops if the shift of duct C is blocked.

[0024] It should be noted that the mechanism producing the oscillation of the sprinkler need not necessarily include a crank, as long as it is capable of limiting the extent of said oscillation.

[0025] For example, in the third embodiment illustrated in figs.7 and 8 the actuator means is a piston Z whose stem W is pivoted at its free end directly to the lower lever L through pin Y (fig.3). Piston Z is typically an electric device, but like in the first embodiment illustrated above it is also possible to exploit the pressure of the water coming from the washing pump to drive it. Furthermore, the water flow may be controlled by one or

more valves acting as operating switch for the oscillatory motion of sprinkler S.

[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 motor reducer M, gears V, R and piston Z are just examples of other possible devices suitable to control the horizontal shift of sprinkler S. Similarly, the frictional engagement between the actuator and the duct may be achieved through other means mechanically equivalent to those illustrated above, and the same applies to the mechanism for shifting sprinkler S, the latter possibly being of any type and in particular also of the orbital type.

Claims

1. A revolving sprinkling assembly for dishwasher including at least a sprinkler (S) revolving in the horizontal plane due to being provided with at least one propulsion nozzle and to being centrally pivoted at an end of a horizontal duct (C) through which water under pressure is fed, said duct (C) being in turn vertically pivoted at its other end to a hollow shaft (A) integral with the washing space, **characterized in that** it further includes a device suitable to produce an oscillation of said duct (C) around the axis (X) of said shaft (A), said device including a mechanism suitable to limit the extent of said oscillation and at least an actuator means for driving said mechanism.
2. A sprinkling assembly according to claim 1, **characterized in that** said mechanism includes a crank mechanism consisting of a connecting rod (B; B') pivoted at one end onto a gear (G; R) which acts as a crank and is driven by said actuator means.
3. A sprinkling assembly according to claim 2, **characterized in that** the actuator means is a train of gearing (R) arranged on the upper side of the duct (C) and driven into rotation by the sprinkler (S) through a toothed rim (V) externally formed at the base of the sprinkler (S), the connecting rod (B') being pivoted at its other end to a pin (E) integral with the washing space.
4. A sprinkling assembly according to claim 2, **characterized in that** the actuator means is a motor reducer (M), the connecting rod (B) being pivoted at its other end to a kinematic chain which transmits the motion to the duct (C).
5. A sprinkling assembly according to claim 1, **characterized in that** said mechanism includes a stem (W) pivoted at one end to a kinematic chain which transmits the motion to the duct (C).
6. A sprinkling assembly according to claim 4 or 5, **characterized in that** said kinematic chain consists of a lower lever (L) keyed onto a vertical spindle (T) which transmits the motion thereof to an upper lever (U) provided with a slot in which there is engaged a peg (P) integrally formed on the lower side of the duct (C).
7. A sprinkling assembly according to claim 6, **characterized in that** said kinematic chain includes a frictional engagement between the lower lever (L) and the upper lever (U).
8. A sprinkling assembly according to claim 7, **characterized in that** the frictional engagement is achieved by transversely dividing the vertical spindle (T) into two portions kept in contact by the push of a spring.
9. A sprinkling assembly according to one or more of the preceding claims, **characterized in that** the actuator means exploits the pressure of the water coming from the washing pump to drive the mechanism which shifts the duct (C).
10. A sprinkling assembly according to claim 9, **characterized in that** it further includes at least one valve suitable to control the flow of water to the actuator means so as to act as operating switch for the oscillatory motion of the sprinkler (S).
11. A dishwasher with a rectangular washing space, **characterized in that** it includes a sprinkling assembly according to one or more of the preceding claims.

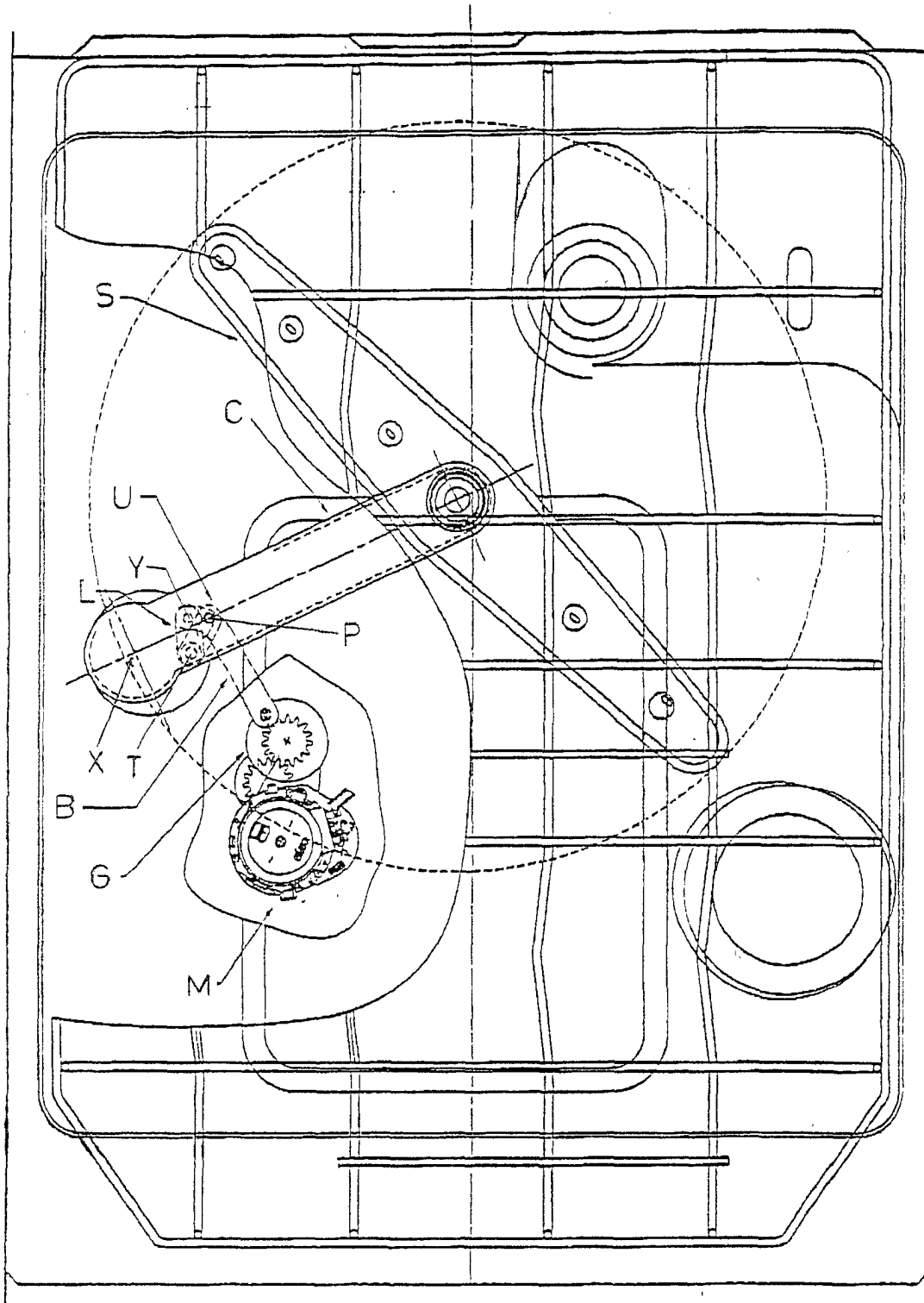


Fig. 1

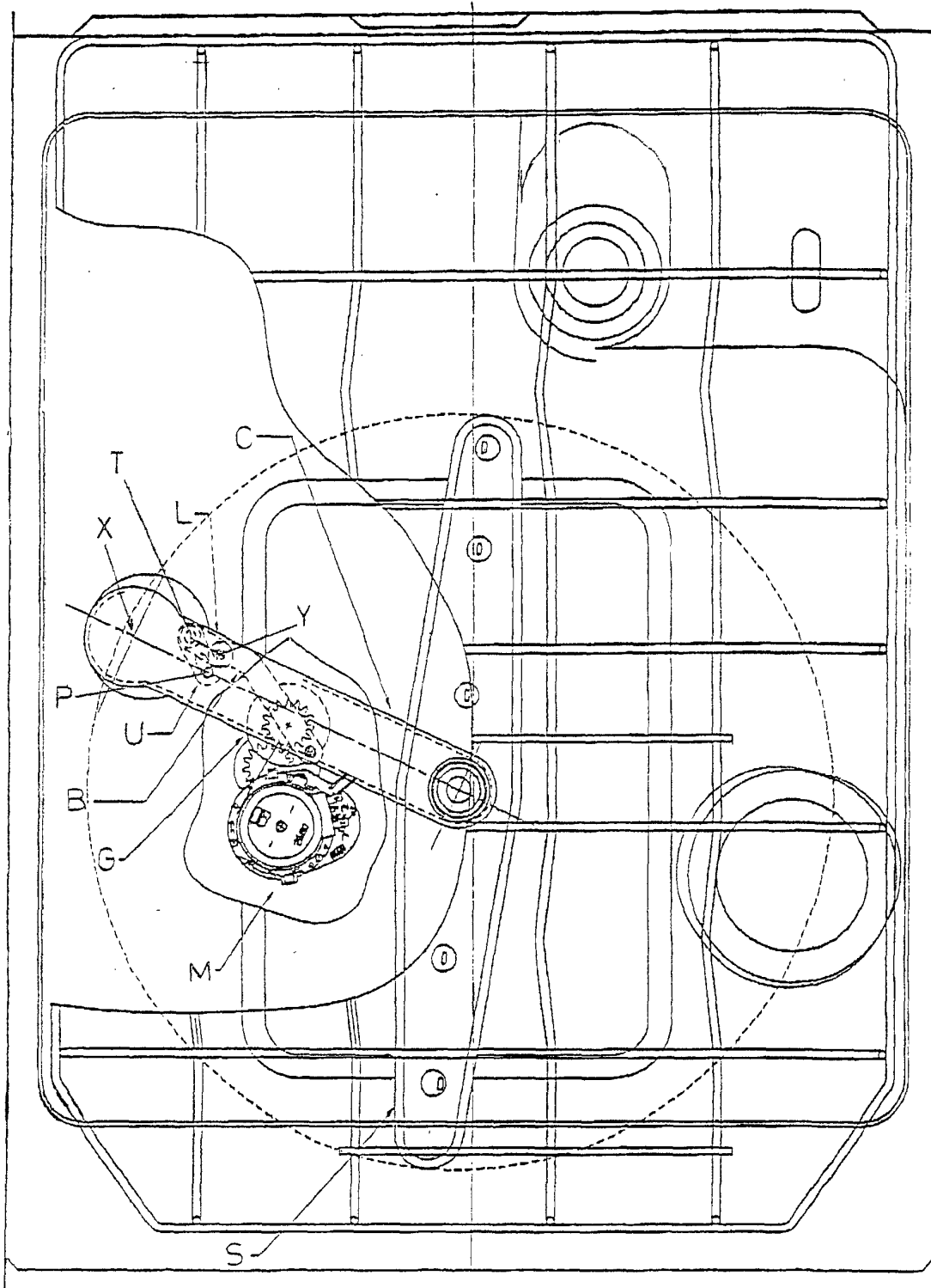
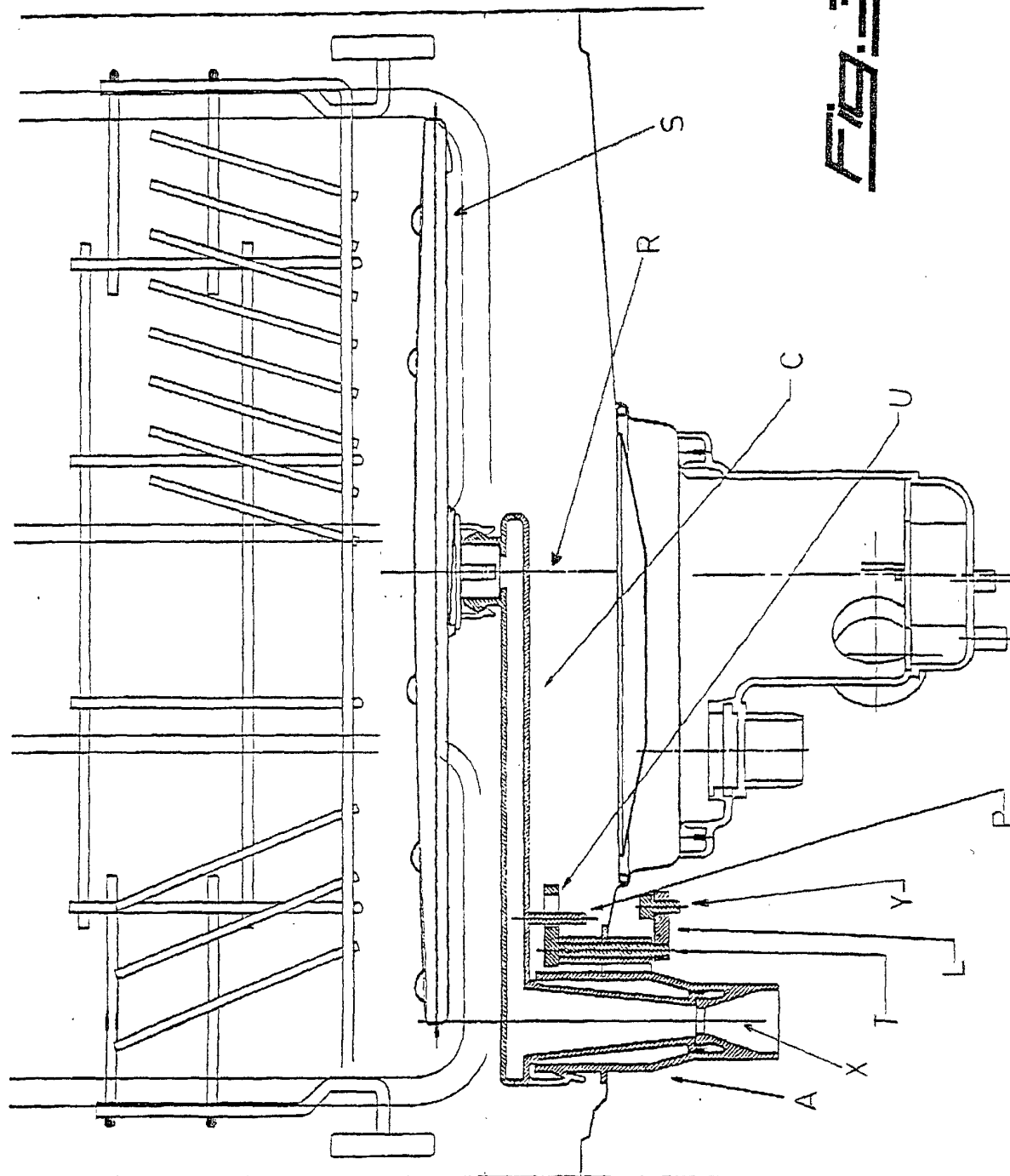


Fig. 2



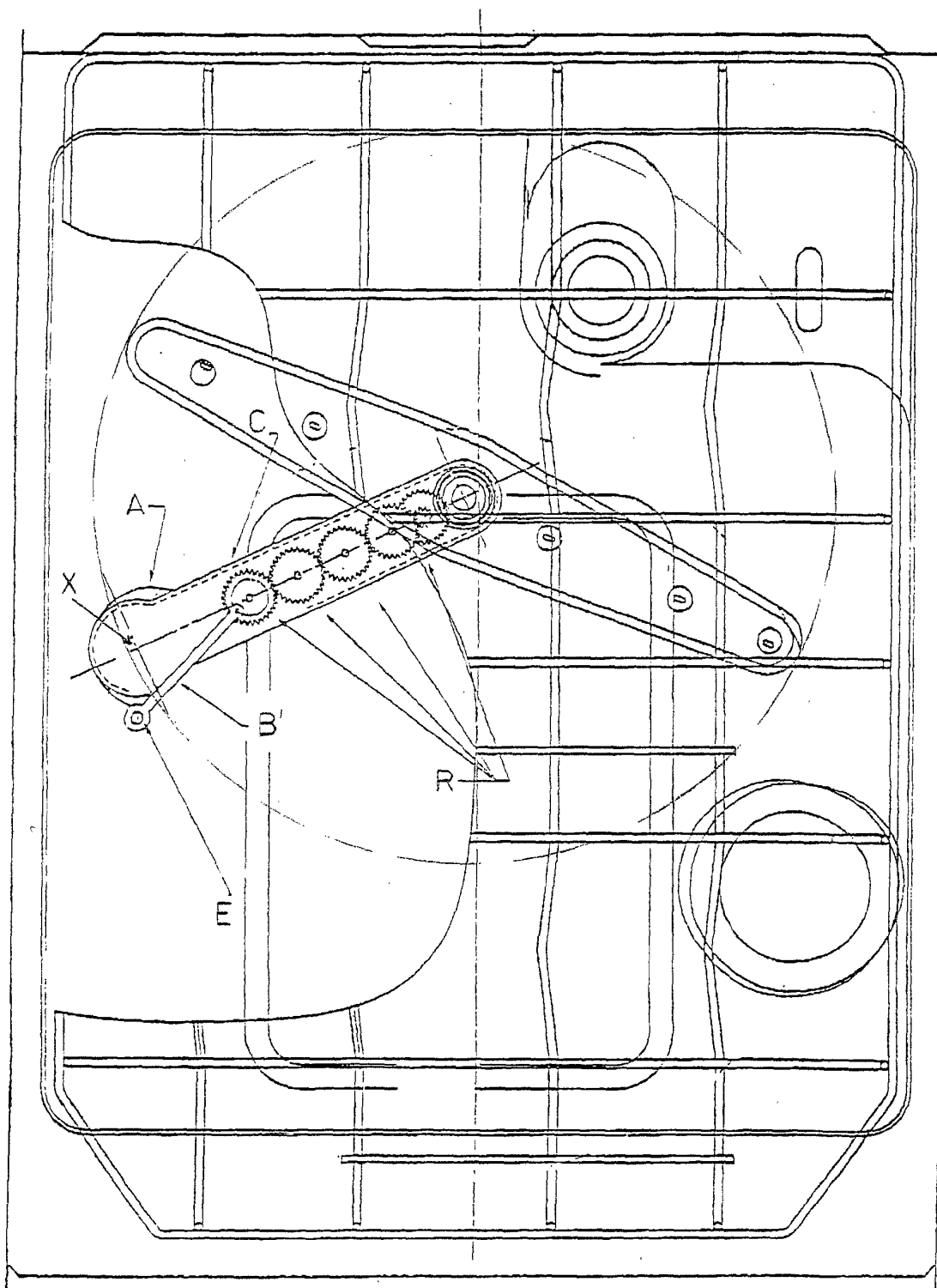


Fig. 4

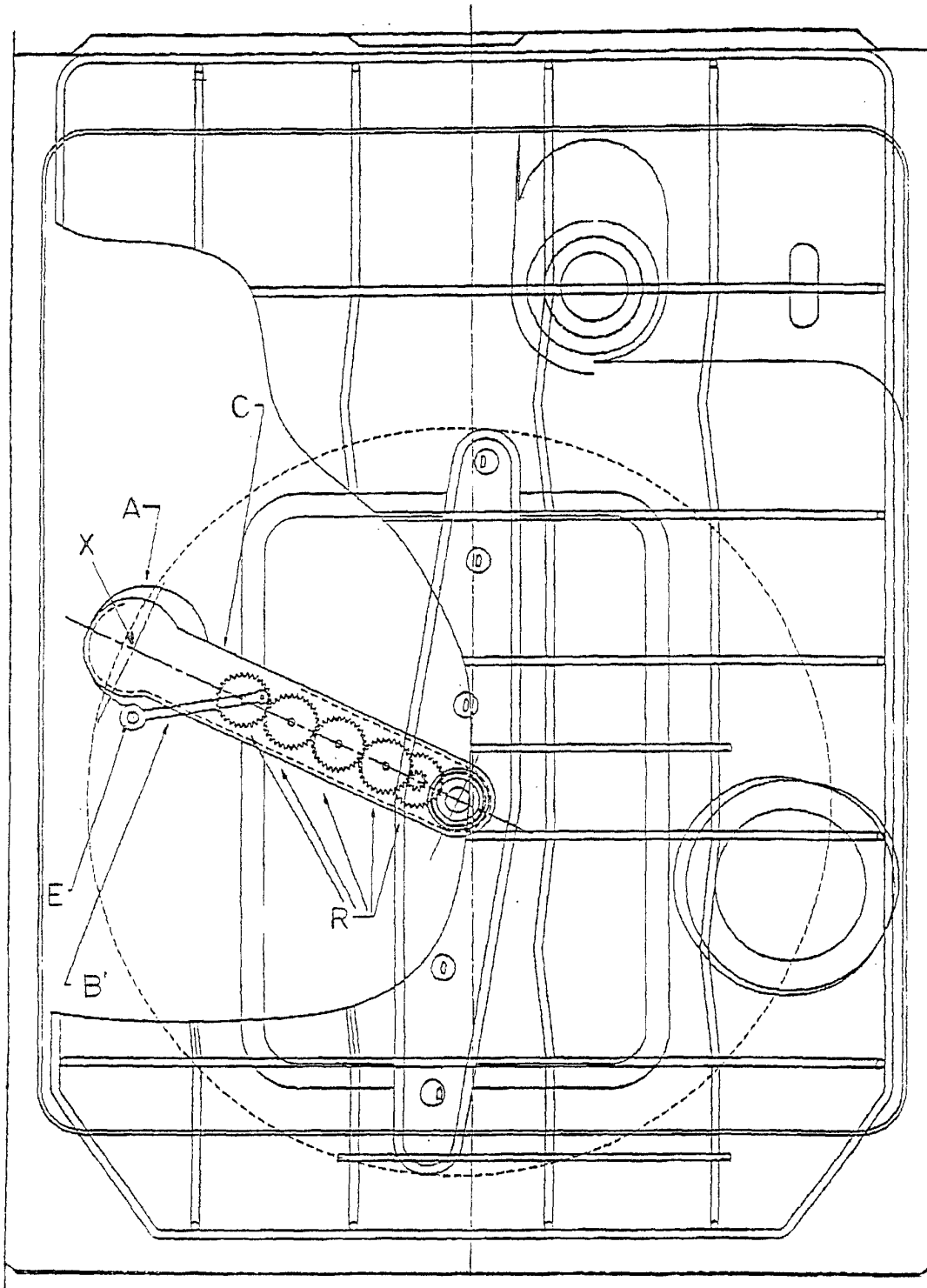


FIG 5

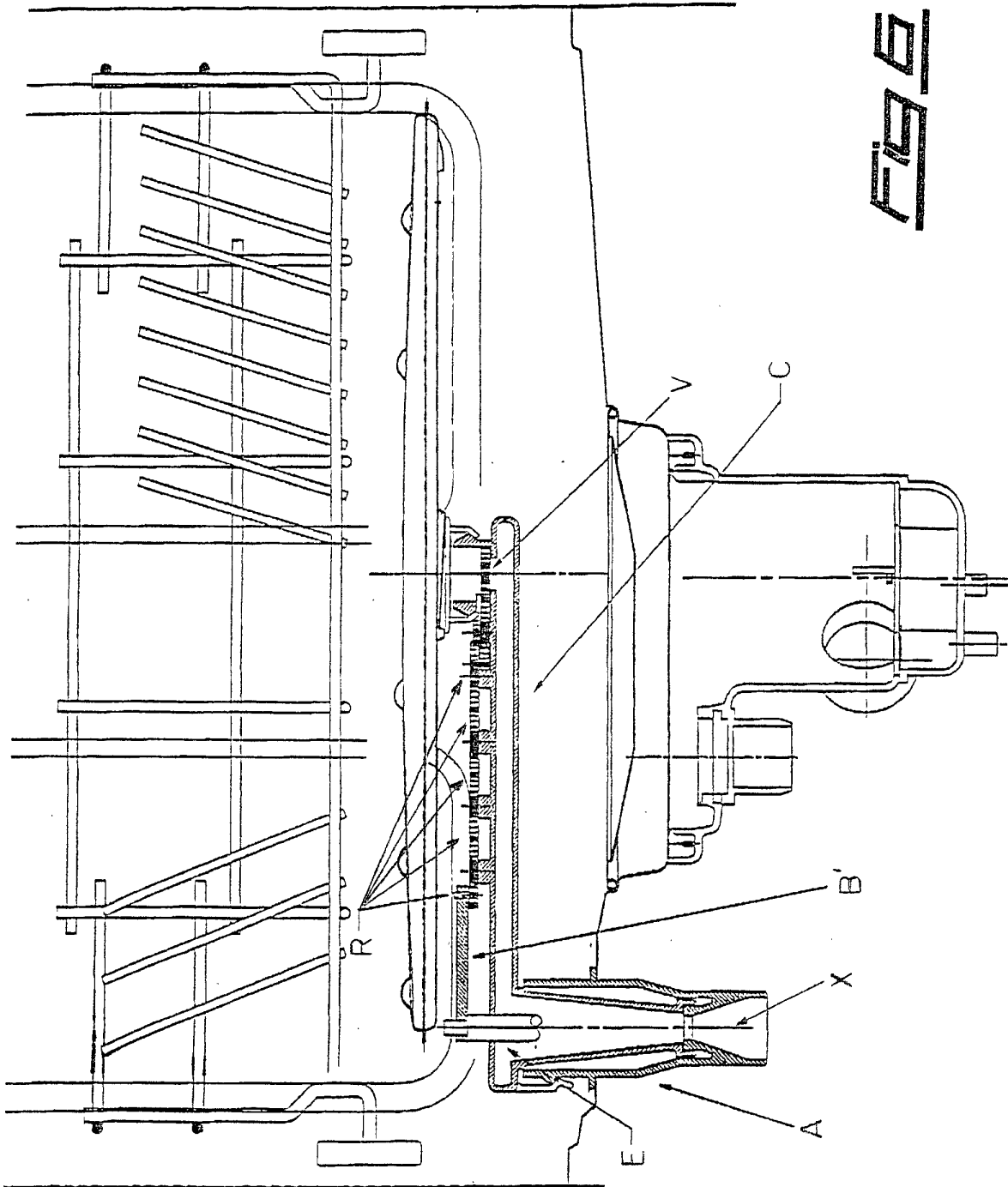


FIG. 6

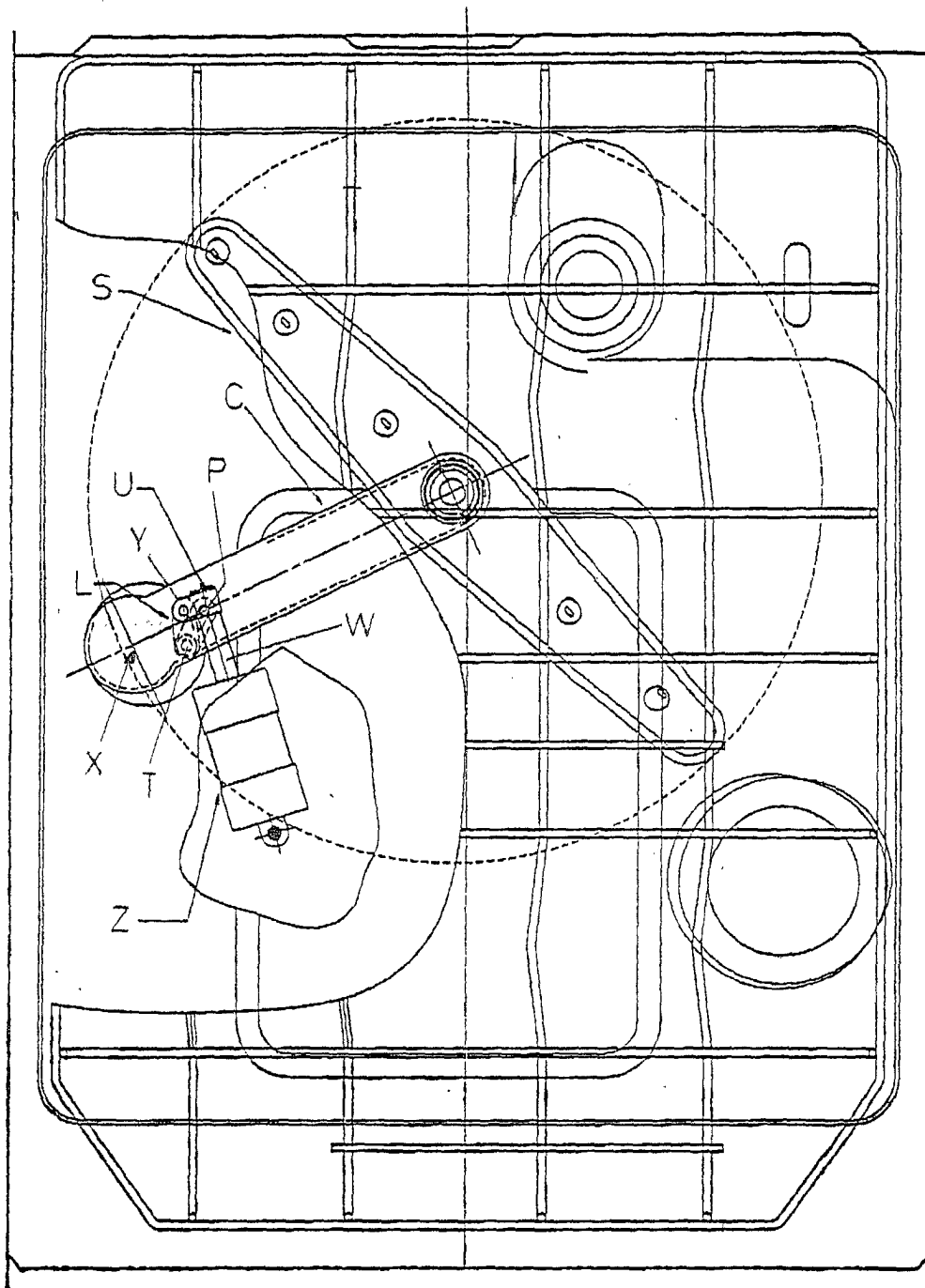


Fig 7

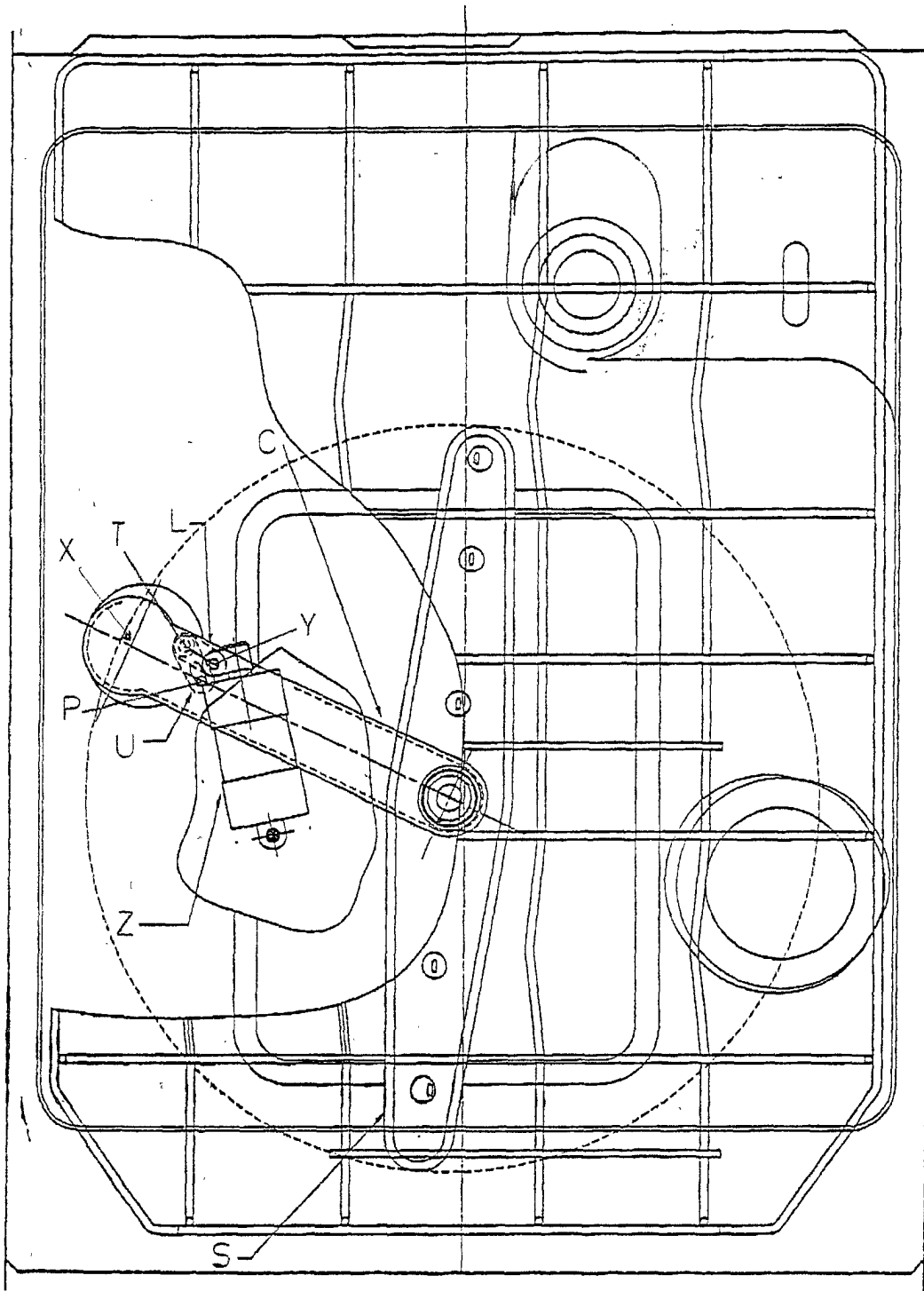


FIG 8