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(54) Timer particularly for household appliances

(57) A timer particularly for household appliances which comprises an electronic printed circuit (10) constituting the supporting base for electromechanical components which comprise a driving motor (11) which is kinematically connected to a rotating cam (24) which constitutes the selector of a plurality of contacts (29) which are rigidly coupled to the printed circuit, with which it is operatively associated.

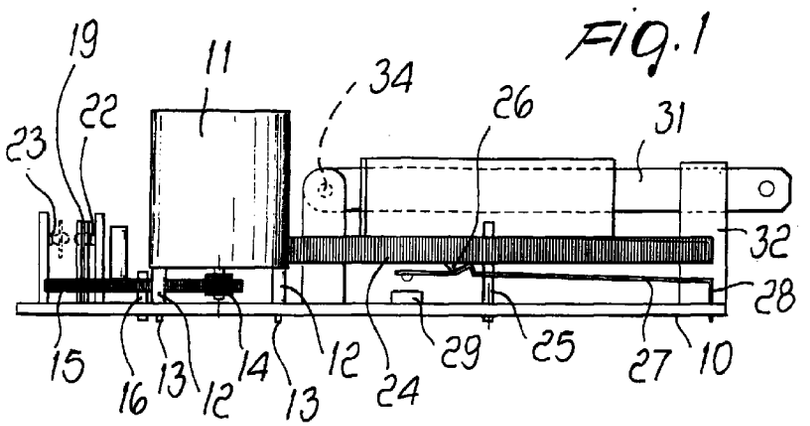

Fig. 1

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Description

[0001] The present invention relates to a timer.

[0002] The timer is to be used particularly but not exclusively for household appliances such as washing machines, dishwashers, etcetera in which it is necessary to manage an appropriately provided operating program.

[0003] Several timers are currently used for household appliances, such as washing machines and/or dishwashers, in which an appropriately provided operating program is run for water heating, washing, rinsing, spin drying and optional additional drying.

[0004] The most widely used timers are the electromechanical timers, which are the cheapest and are currently preferred owing to the presence of the knob-type selector, to which users are now accustomed also because it allows to directly visualize the progress of the program.

[0005] There are also electronic timers, which are more sophisticated and expensive.

[0006] A third type of timer is constituted by hybrid timers, which are composed of an electronic part and of an electromechanical part.

[0007] These timers also have the selection knob and are generally cheaper than electronic timers.

[0008] In hybrid timers, one type of structure entails providing the electronic part on a printed circuit and the electromechanical part on another base and then welding the electromechanical part to the printed circuit.

[0009] In other cases, the electromechanical part and the electronic part are again provided separately and then mutually connected by means of electrical cables, so that they remain physically separate but generally occupy a considerable amount of space.

[0010] The aim of the present invention is to provide a hybrid timer which has a simplified structure with respect to current timers, so that its production is simplified and its components are reduced.

[0011] Within the scope of this aim, an object of the present invention is to provide a hybrid timer in which the outputs can be organized so as to simplify the wiring.

[0012] A further important object is to provide a timer which allows higher standardization.

[0013] A further important object is to provide a hybrid timer the cost whereof is lower than that of current timers.

[0014] This aim, these objects and others which will become apparent hereinafter are achieved by a timer particularly for household appliances, characterized in that it comprises an electronic printed circuit which also constitutes the supporting base for electromechanical components which comprise a driving motor kinematically connected to a rotating cam which constitutes the selector of a plurality of contacts rigidly coupled to said printed circuit, said cam being operatively associated with said contacts.

[0015] Further characteristics and advantages of the invention will become apparent from the following detailed description of two embodiments thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a schematic side view of a timer according to the invention in a first embodiment;
Figure 2 is a schematic top plan view of the timer of Figure 1;
Figure 3 is a schematic top plan view of a timer according to the invention in a second embodiment;
Figure 4 is a side view of the timer of Figure 3;
Figure 5 is a side view, taken at right angles to the view of Figure 4;
Figure 6 is an enlarged-scale side view of a detail of Figure 3;
Figure 7 is an enlarged-scale top view of a detail of Figure 3.

[0016] With reference to the above Figures 1 and 2, a timer according to the invention, in a first embodiment, has a structure which comprises an electronic printed circuit, of which only the board, designated by the reference numeral 10, is shown for the sake of simplicity, taking into account that the components are arranged on the upper face of Figure 1 and the connections, particularly the power connections, are located on the lower face.

[0017] When using a single-sided circuit, both the electronic components and the connections can instead be located on, and welded to, the lower face.

[0018] The board 10 constitutes the supporting base for electromechanical components, which in turn comprise an electric driving motor 11 which, as shown in particular in Figure 1, has legs 12 and pins 13 which support it on the board 10; in particular, the pins 13 are inserted and welded in suitable holes of the board.

[0019] The motor 11 has, at its output, a pinion 14 which meshes with a first gear 15, the shaft 16 of which is also inserted and welded in a suitable hole of the board 10.

[0020] The gear 15 can of course rotate about the shaft 16.

[0021] The first gear 15 meshes with a second gear 17 which is rigidly coupled in the same manner to the board 10 and in turn meshes with a third gear 18, which is also rigidly coupled to the board 10 and which constitutes a circular cam since it is provided, in an eccentric position, with a pin 19. The pin interacts with a cam follower which is constituted by a reed switch 20 rigidly coupled in a cantilevered manner to the board 10 and which acts, with one of its ends 21, between two contacts 22 and 23 which are also fixed in a cantilevered manner to the board 10 in the same way as the preceding components.

[0022] The two contacts 22 and 23 schematically represent, in this case, the "reversing" function of the wash-

ing motor of a washing machine (not shown).

[0023] The motor 11 drives the circular cam 18 and the cam follower 20 separately because there is a clutch system, not shown in the figures, by which the respective transmission trains are alternately freed depending on the direction of rotation of said motor.

[0024] The second gear 17 again meshes with a fourth gear 24 which, as shown in the figures, has a shaft 25 which is fixed in the same manner as the preceding ones to the board 10 and constitutes a double cam of the cylindrical and circular type.

[0025] Said double cam in fact has, on its lower surface, a plurality of raised portions 26 which interact, in their path, with respective cam followers which are constituted by reed switches 27 which are fixed by means of one end 28 to the board 10 and can flex axially in order to engage contacts 29.

[0026] The contacts are preferably constituted by pads applied by SMD methods (surface mounting), welding and execution directly on the electronic circuit.

[0027] As mentioned, the fourth gear 24 also constitutes a circular cam by having, on its upper part, an eccentric shaped portion 30 which interacts, in its path, with a cam follower constituted by a reed switch 31 which is fixed in a cantilevered manner, by means of a support 32, to the board 10 and can flex at right angles to the preceding switches 27 between two contacts 33 and 34 which are also supported by corresponding supports which are fixed to the board 10 in a cantilevered arrangement.

[0028] The contacts 33 and 34 are two power contacts.

[0029] A knob, not shown in the drawings, is conveniently mounted on the shaft of the fourth gear 24 and is available for actuation by the user.

[0030] At this point it should be noted that it is possible to apply to the electronic board 10, at the regions for the insertion of the various fixing pins or shafts of the mechanical components, metal or plastic bushes which are adapted to strengthen the coupling if necessary.

[0031] In practice it has been observed that the intended aim and objects of the present invention have been achieved.

[0032] By using the printed circuit as a structural and supporting component for the electromechanical part, the construction of the timer has been greatly simplified and the components have been reduced considerably.

[0033] A further particularly important advantage achieved is size reduction and the possibility to organize the outputs, particularly of the reed switches 27, simplifying the wiring and also providing standardization (i.e., switches 27 can be provided for a plurality of functions or operations and can be conveniently excluded according to the use to which the timer can be assigned).

[0034] All these advantages have of course conveniently led to a considerable cost reduction which makes the product commercially competitive.

[0035] With reference to the above Figures 3 to 7, a timer according to the invention, in a second embodiment, has a structure comprising an electronic printed circuit, of which only the board, designated by the reference numeral 110, has been shown.

[0036] The board 110 constitutes the supporting base for electromechanical components which in turn comprise an electric driving motor 111.

[0037] The motor 111 supports on its output shaft, with an idler gear 112 interposed, a disk 113 which is eccentric with respect to the shaft and is accommodated in a complementarily shaped seat 114 of a pawl 115 which is operatively connected to a wheel 116 with saw-tooth protrusions 117.

[0038] The wheel 116 is rotatably coupled to the board 110.

[0039] The pawl 115 is rigidly coupled so as to perform substantially only reciprocating movements due to the rotations of the disk 113 (except for small return movements due to the presence of elastic means which are not shown for the sake of simplicity and are required by the shape of the protrusions 117).

[0040] Below the wheel 116 there are four contacts 118, 119, 120 and 121 which are coupled in pairs on respective supports 122 and 123 but are electrically insulated.

[0041] The supports 122 and 123 are arranged at the ends of reed switches 124 and 125 for the first support and 126 and 127 for the second support.

[0042] The contacts 118, 119, 120 and 121 interact with respective contacts which are rigidly coupled to the board 110 (the figures show only the contacts designated by the reference numerals 128 and 129) under the thrust of two cylindrical cam-shaped tracks of the wheel 116, which can be reduced to a single track depending on the specific geometry, only the track 130 being shown; said tracks interact with tabs of the supports 122 and 123 and only the tab 131 is shown.

[0043] The contacts 128 and 129 can be constituted by pads which are applied with SMD methods (surface mounting), welding and execution directly on an electronic circuit.

[0044] The contacts 118, 119, 120 and 121 provide the "reverse" function of the washing motor of a washing machine (not shown).

[0045] The motor 111 has, at its output, a pinion 132 which has the same rotation axis as the eccentric disk 113 and meshes with a first gear 133 whose shaft 134 can be inserted and welded in a suitable hole of the board 110.

[0046] The pinion 132 is connected to the motor 111 with an idler gear 142 interposed; said idler gear is of the same type as the idler gear 112 but is reversed.

[0047] The first gear 133 is rigidly coupled and coaxial to a second gear 135, which meshes with a third gear 136 which is also rigidly coupled to the board 110 and constitutes a cam of the cylindrical type which is arranged coaxially to the wheel 116, which it contains in a suitable seat 137.

[0048] The motor 111 separately drives the wheel 116 and the gear 136 due to the idler gear system by which the respective transmission trains are alternatively allowed to turn freely depending on the direction of rotation of said motor.

[0049] A plurality of raised portions 138 are provided on the lower surface of the gear 136 and interact, along their path, with respective cam followers constituted by reed switches 139 which are fixed, by means of one end 140, to the board 110 and can flex axially in order to engage contacts 141.

[0050] Said contacts can be constituted by pads applied with SMD methods (surface mounting), welding and execution directly on the electronic circuit.

[0051] A knob, not shown in the figures, is conveniently mounted on the shaft of the gear 136 and is available for actuation by the user.

[0052] At this point it should be observed that on the electronic board 110, at the regions where the various pivots or shafts for fixing the mechanical components are provided, it is possible to apply metal or plastic bushes which are adapted to strengthen the coupling if necessary.

[0053] In this embodiment of the timer, the coaxial arrangement of the wheel 116 and of the gear 136, which are the reversing cam and the selector or main cam, is highly advantageous in terms of constructive simplicity and dimensions.

[0054] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

[0055] All the details may also be replaced with other technically equivalent elements.

[0056] In practice, the materials employed, so long as they are compatible with the contingent use, as well as the dimensions, may be any according to requirements.

[0057] The disclosures in Italian Patent Application No. PD98A000084 from which this application claims priority are incorporated herein by reference.

[0058] 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. A timer particularly for household appliances, characterized in that it comprises an electronic printed circuit which also constitutes the supporting base for electromechanical components which comprise a driving motor kinematically connected to a rotating cam which constitutes the selector of a plurality of contacts which are rigidly coupled to said printed circuit, said cam being operatively associated with said contacts.

2. The timer according to claim 1, characterized in that said rotating cam includes a cylindrical cam for the contacts of the various operating functions and a circular cam for the power contacts.

3. The timer according to claim 1, characterized in that said rotating cam transmits motion to an additional cam for reversing the motion of a motor which is connected to the elements that provide the operating functions.

4. The timer according to claim 3, characterized in that a system with friction elements connected to said transmission alternately actuates said cams by means of respective gear trains depending on the direction of rotation of said motor connected to the elements that provide the operating functions.

5. The timer according to claim 4, characterized in that said gears are rigidly coupled to shafts which are inserted and fixed in a cantilevered manner in holes of the board of said printed circuit in which they are welded.

6. The timer according to claim 5, characterized in that bushes made of metal or plastics are applied to said holes.

7. The timer according to claim 5, characterized in that said motor is provided with legs and pins which are inserted and welded in said holes of the board of said printed circuit.

8. The timer according to claim 1, characterized in that the contacts related to said rotating cam are constituted by pads which are applied to said board of said electronic circuit.

9. The timer according to claim 3, characterized in that said rotating cam that constitutes the selector of a plurality of contacts rigidly coupled to said printed circuit and said reversing cam are arranged coaxially.

10. The timer according to claim 9, characterized in that four contacts are arranged below said reversing cam and are coupled in pairs on respective supports but are electrically insulated, said supports being arranged at the ends of reed switches.

11. The timer according to claim 10, characterized in that said reversing cam is a wheel with sawtooth protrusions which is operatively connected to a pawl which is provided with a seat which accommodates a disk which is eccentrically rigidly coupled to the axis of said motor.

12. The timer according to claim 9, characterized in that

on the lower surface of said rotating cam there is a plurality of raised portions which interact, in their path, with respective cam followers constituted by reed switches which are fixed, by means of one end, to the electronic board and can flex axially in order to engage contacts which are rigidly coupled to said board.

13. The timer according to claim 9, characterized in that said rotating cam contains said reversing cam in a suitable seat.

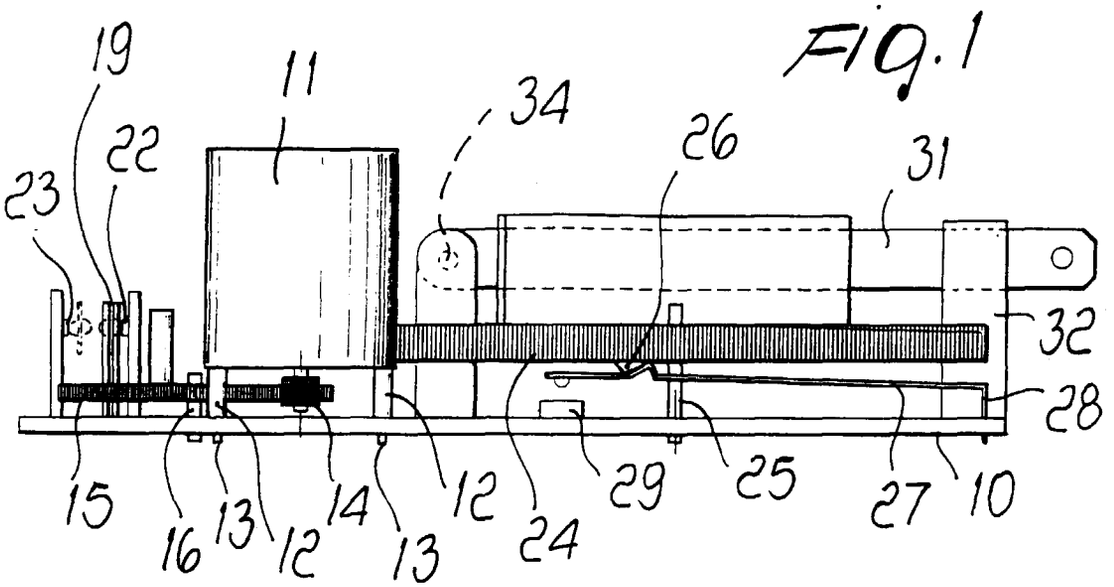
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FIG. 1

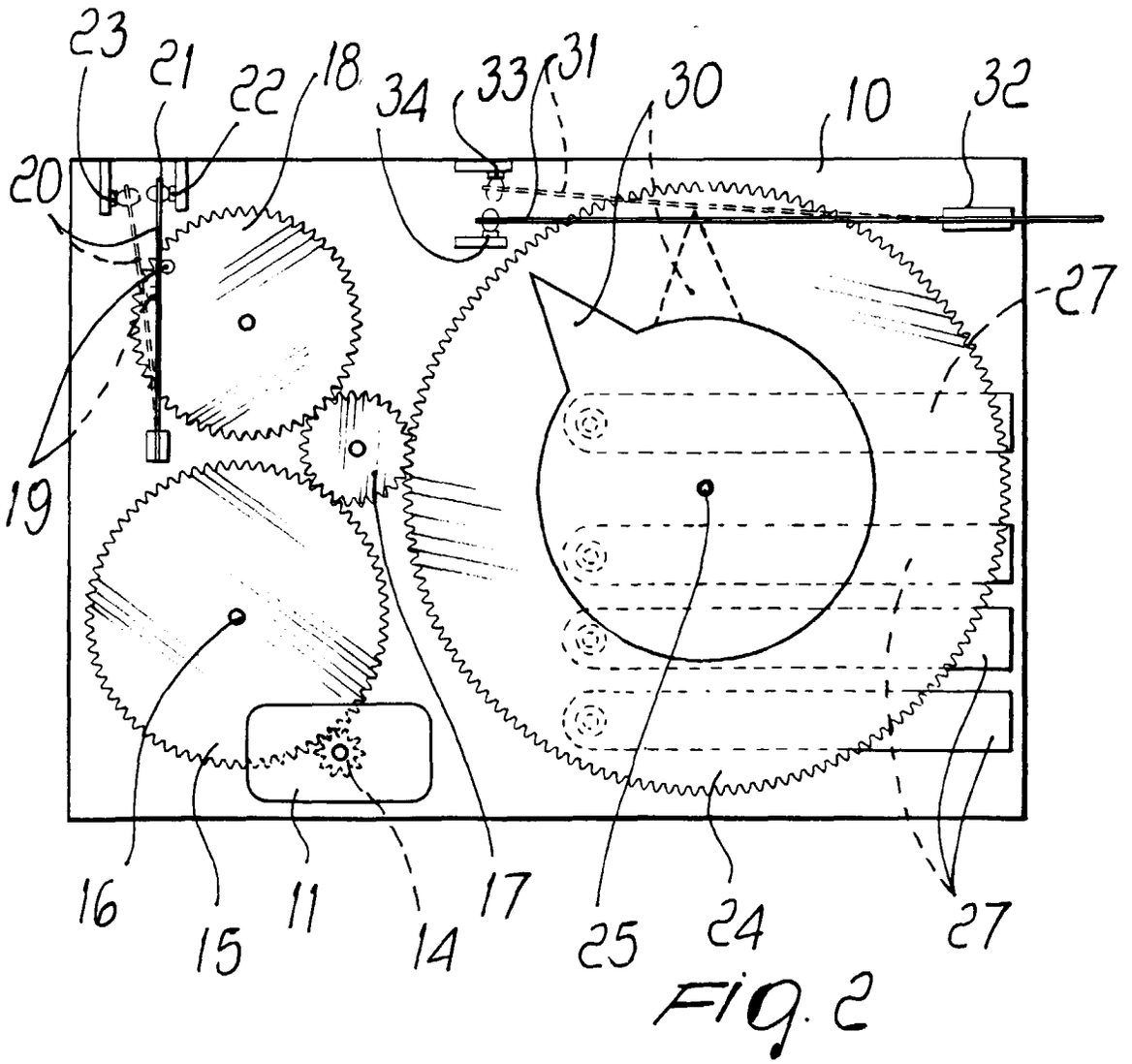
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FIG. 2

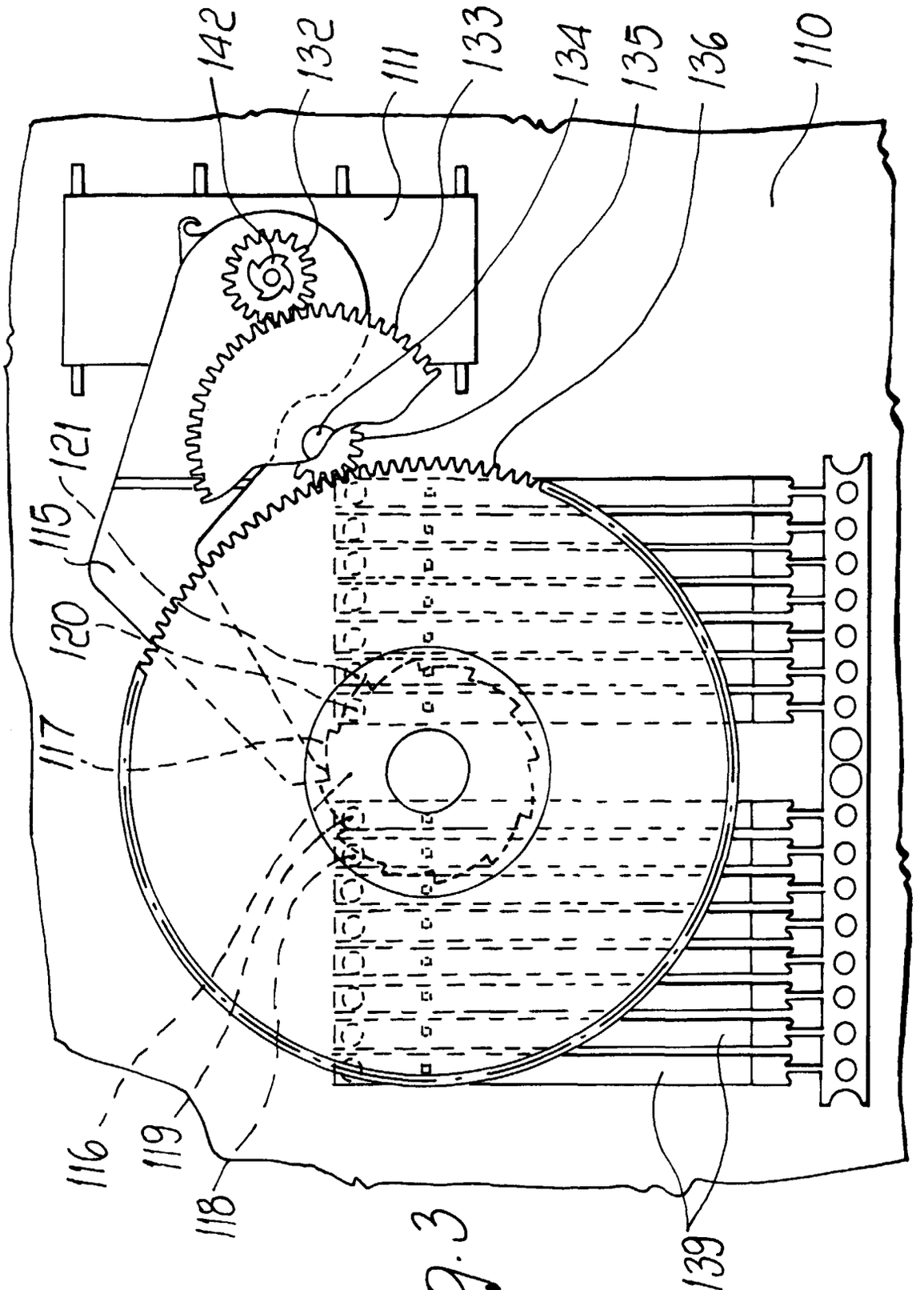

Fig. 3

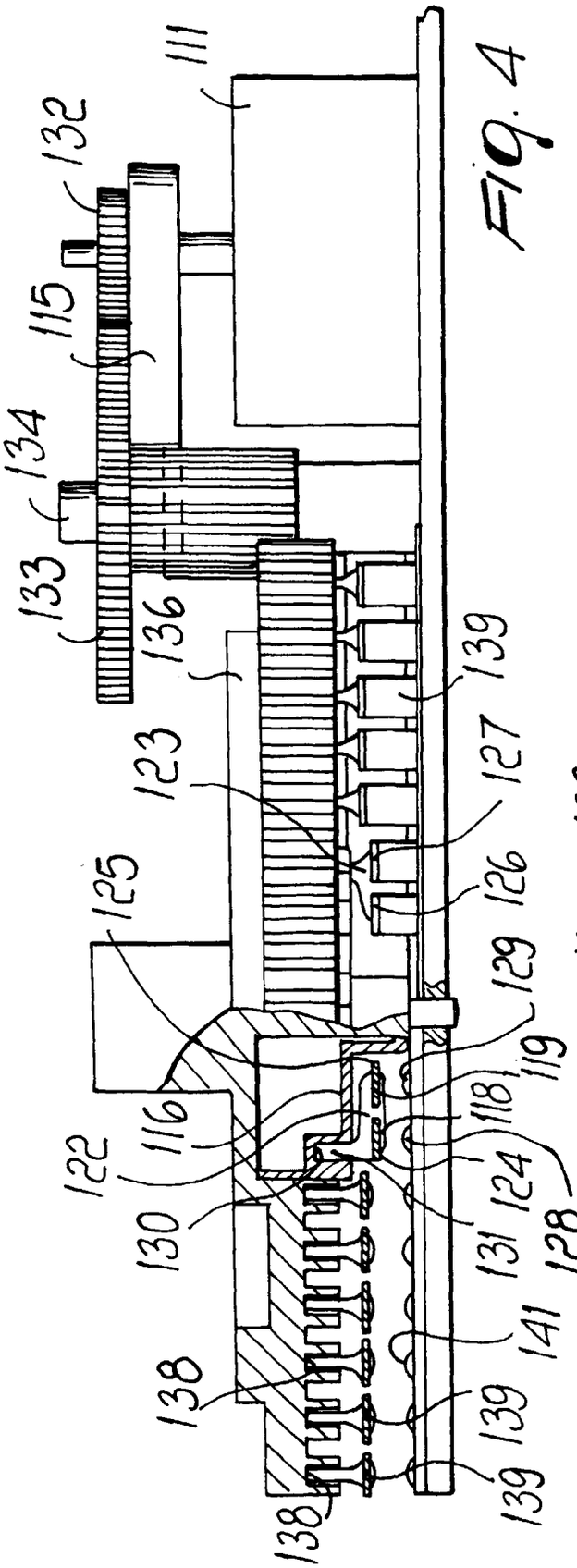
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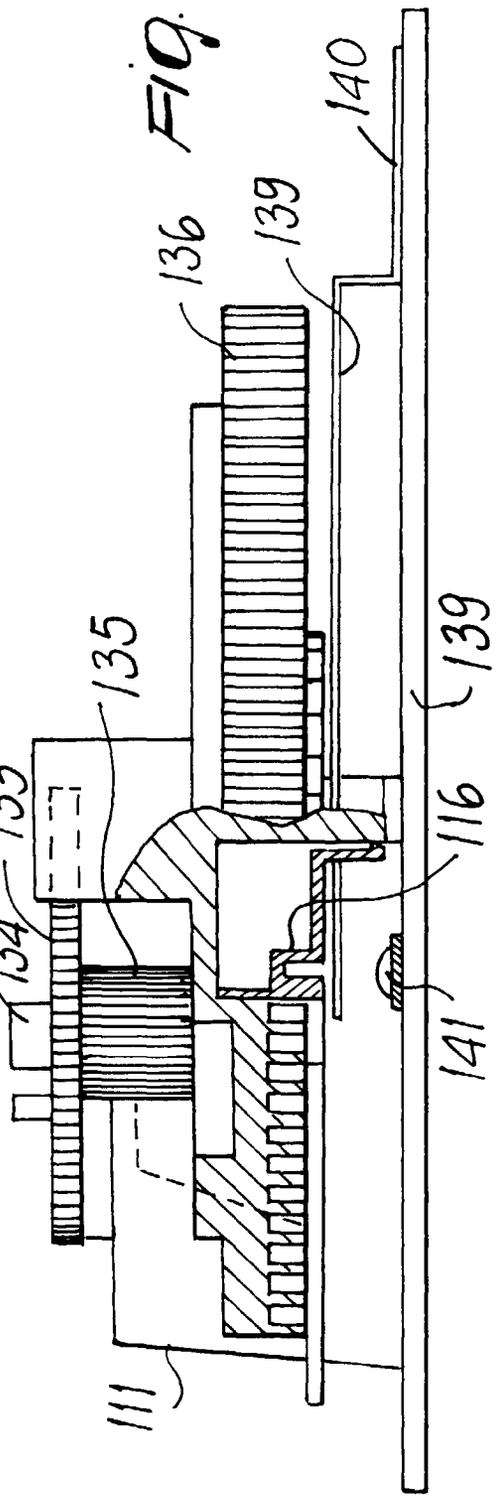
Fig. 4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111

Fig. 5

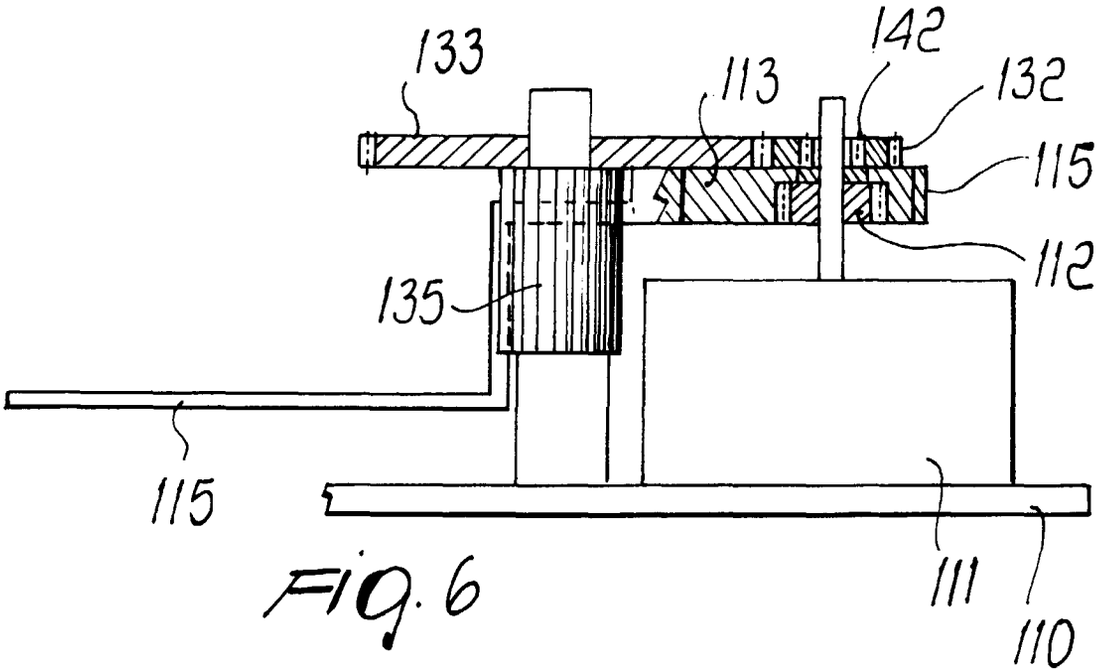
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FIG. 6

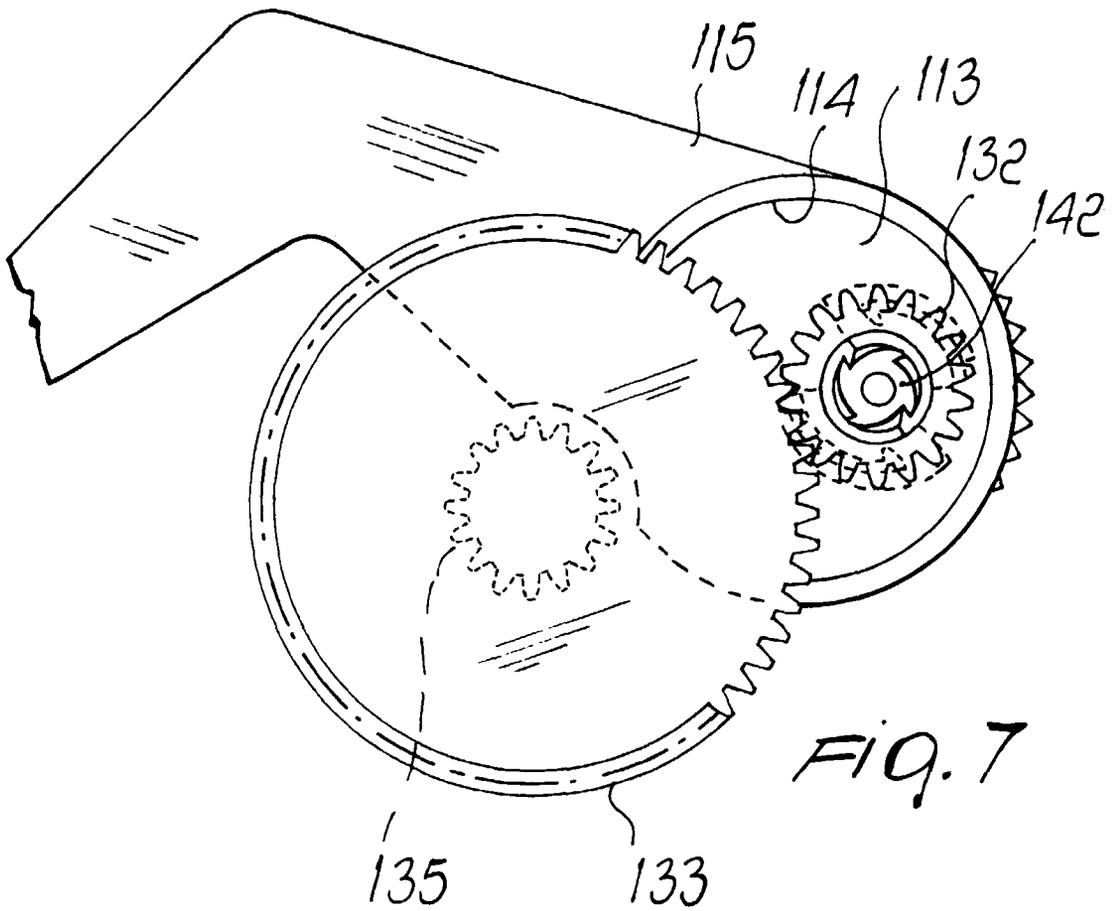
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FIG. 7