

## PATENT SPECIFICATION



Convention Date (France): May 9, 1938.

528.068

Application Date (in United Kingdom): April 26, 1939. No. 12543/39.

Complete Specification Accepted: Oct. 22, 1940.

## COMPLETE SPECIFICATION

### Instructive and Demonstration Apparatus or Toy for the Construction of Various Electric Machines

I, MAURICE LATOUR, of 10, Avenue Marignan, La Varenne-Saint-Hilaire, France, a French Citizen, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention has for its object the provision of an instructive and demonstration apparatus or toy for the construction of various electric machines.

Toys have already been proposed comprising independent mechanical and electrical members which the young constructor assembles according to his imagination, or according to indications supplied by the tables accompanying the box containing the various members. In known demonstration toys or apparatus, the attention is first of all arrested by difficulties of mechanical order. In fact, the assemblage of the various parts, particularly when centering is necessary, is extremely delicate and great accuracy cannot be attained. In these conditions, even with correct electric assemblages, the machines constructed do not work or work badly, this removing all attractiveness and rapidly discouraging the young constructor.

The problem which the Applicant has solved consists, in allowing the construction of various electric machines by means of simple mechanical elements and elementary electric members, whilst practically eliminating the main mechanical difficulties and leaving apparent only difficulties of an electrical order.

One of the main mechanical difficulties, particularly in the case of rotating machines, resides in the centering of the rotors relatively to the stators.

The present invention consists in positively defining a longitudinal axis and several radial axes at right angles to the longitudinal axis and uniformly distributed about the latter, by means of a member about which are mounted the various outer parts, said member being then removed for allowing the assemblage of the inner apparatus

which is thus perfectly centered relatively to the outer unit.

In one form of construction, the removable assembling member defines three axes at right angles to each other and has, for that purpose, the shape of a right angled cross with arms of equal length the ends of which arms are bent down on one and the same side, the central part being perforated as well as the bent down ends for defining the three above mentioned axes.

The removable assembling member is combined with external stays allowing the mounting of the fixed unit at a suitable distance from said member.

The main independent elements which, after assemblage, form the fixed unit of the machine or of the assembly, are constituted by rectilinear, arcuate, angularly bent U-shaped or other suitably shaped plates, the ends of which are provided with notches or oblong and longitudinal holes.

Some of these members are made of brass, aluminium, or the like and are used for different assemblages.

Members are also available which allow of constituting interchangeable pole-shoes of different widths and curvatures.

The invention also extends to the particular construction of brushes and their adjusting devices as well as the construction of rotors and collectors.

The invention also includes other particular points which will appear in the following text with reference to the accompanying drawing, given by way of example only, in which:—

Figs. 1 to 8 are perspective views showing various embodiments of assemblages utilising a removable member having the shape of a right angled cross with arms of equal length.

Fig. 9 is a perspective view of an assemblage with two windings.

Fig. 10 is a perspective view of a rotor.

Fig. 11 is a perspective view of another rotor.

Fig. 12 is a perspective view of an assemblage comprising a perfectly centered rotor and stator.

Fig. 13 is a perspective view of another

embodiment of a rotor.

Fig. 14 is an elevation of the assemblage of adjustable brushes.

Fig. 15 is a perspective view showing the constitution and the assemblage of a collector.

Fig. 16 is a perspective view of an embodiment of a rotating contact.

Fig. 17 is a perspective view of an assemblage member.

Fig. 18 is a perspective view of an assemblage in the case when use is made of a member made of brass or the like.

Figs. 19 and 20 are perspective views of two interchangeable pole-shoes.

In the various embodiments, illustrated by way of example only, use is made, for assembling the outer unit, of a member 1 in the shape of a right angled cross with arms of equal length the ends of the branches 2 of which are bent down at right angles on one and the same side, as more particularly shown in figs. 1 to 8.

The member 1 is axially perforated at 3 for defining an axis 4 and the bent down ends 2 are also perforated for defining two axes 5 and 6. These axes 5 and 6, located in one and the same plane, are at right angles to each other and to the axis 4. By means of tubular stays 7, secured on the lugs 2 by screws 8, the axes 5 and 6 are positively determined and the distance at which the outer unit is to be mounted relatively to the axis 4 is practically determined.

The stays 7 comprise, at their outer ends, shoes or seating members 9 facilitating the assemblage of arcuate plates 10 the ends of which are provided with longitudinal oblong notches 11. These oblong notches can be replaced by oblong holes. The arcuate plates 10 are secured to the corresponding stays by screws 12 and they are connected by identical intermediate plates secured by bolts 14 and nuts 15. An outer unit is thus obtained which is perfectly centered relatively to the axis 4.

The assemblage previously indicated is more particularly illustrated in fig. 1. In order to effect the placing in position of the bearings or supports of the rotor according to the axis 4, the two vertical stays extending according to the axis 5 are removed, and member 1 is caused to rotate through 90 degrees about the axis 6 to bring it to the position shown in fig. 2. For correctly placing said member 1 in its new position, a rod 4a is mounted in the central perforation 3 of member 1, said rod being temporarily held stationary at its ends on the outer unit along the axis 5, through the medium of nuts 18. The perforations provided on the lugs 2, which perforations served to determine the axis 5 in fig. 1, are now arranged along and

define the axis 4 in fig. 2. The screws of the axis 6 are then locked for holding the member 1 stationary in position and the rod 4a is dismantled.

Reference will now be made to fig. 3 in which the axis 4 is defined by a rod 4b allowing the correct assemblage of one of the bearings of the rotor. For that purpose, use is made of bent plates 19 and rectilinear plates 20, these plates being provided at their ends with longitudinal oblong notches or holes as previously indicated for plates 10. As illustrated in fig. 4, the assemblage of the other bearing is then effected, in a similar manner to that previously indicated with reference to fig. 3.

The outer unit being perfectly centered relatively to the longitudinal axis 4, the member 1 is dismantled for allowing, in the first place, the various electric elements to be mounted on the fixed framework and then the mounting of the rotor.

The mechanical assemblage of the various elements is effected without any difficulty and with very great accuracy, and the young constructor can give all his attention to the placing in position of the electric elements and to the execution of the electric connections. If the machine constructed fails to work, the mistakes in the assemblage do not arise from the mechanical part, but solely from the electrical part.

For facilitating the assemblage of the outer unit, as particularly indicated in fig. 1, between the outer platens or seating members 9 rigid with the stays 7 and the corresponding plates 10, can be interposed elements 23 more particularly illustrated in fig. 17. These elements which are of square shape, have two opposite sides 23a bent at right angles, in one direction and two other opposite sides 23b bent in the reverse direction. Said elements 23 avoid an eccentric assemblage of the outer unit relatively to the axis 4. The elements 23 are also used for assembling two members at right angles to each other. Thus, in figs. 1 to 4, said elements 23 allow of correctly assembling the feet 25 forming a base.

Figs. 5 to 8, which correspond, as regards the method of procedure, to figs. 1 to 4, illustrate the assemblage of a fixed outer unit constituted by two rectangular frames 30 and 31 at right angles to each other. The frames 30 and 31 are constituted by plates 32 connected at their ends by bent members 33, said members and said plates being provided with longitudinal oblong notches or holes. Moreover, for maintaining the alignment of the various members, use can be made of

elements such as 23 (fig. 17) or similar parts which comprise only lifted opposite edges such as 23a, the edges 23b being done away with.

5 Fig. 9 substantially corresponds to fig. 8 and shows the assemblage of coils 38 correctly arranged before disassembling the member 1.

10 Fig. 10 diagrammatically illustrates the assemblage of a rotor on a spindle 40. Use is made of a U-shaped support 41 which is locked in position on the spindle 40 by means of a slotted tubular bolt 42 and nuts 43 having a frustum-shaped bore.

15 The branches of the support 41 are provided with longitudinal oblong notches or holes for securing in position, by means of screws 45 and 46, the stays 47 and members 48 and 49.

20 Fig. 11 illustrates another embodiment of a rotor in the case of rotating inductors. In this embodiment, the support 41 has three lateral tongues arranged according to the sides of an equilateral triangle and

25 which are provided with longitudinal oblong notches for securing the various members in position by means of screws 45 and 46.

30 Fig. 12 shows a machine constructed from the assemblage of fig. 5 and which comprises a rotor constructed in accordance with fig. 11. The assemblage of the brushes 50 will be more particularly described with reference to fig. 14 and that of the collector 51 will be indicated when describing figs. 15 and 16.

40 Fig. 13 illustrates, in perspective view, a modified embodiment of a rotor in which use is made of supports 33a constituted by the bent members 33 employed in the case of figs. 5 to 8. These supports 33, which are provided, at their ends with longitudinal oblong notches, are locked on the spindle 40 as indicated concerning fig. 45 10 and the members 49 are mounted by means of bolts and nuts.

50 Fig. 14 illustrates an assemblage of two brushes 50 the ends of which are arranged on either side of a collector 51, said ends partially conforming to the cylindrical shape of said collector. The outer ends of the brushes 50 are mounted and held stationary on spindles 55 rigid with a member 56 mounted on the spindle 55 40 but held against rotation by a resilient washer 57, a toothed wheel 58 being rigid with member 56. A small toothed wheel 59, meshing with the wheel 58, is fast on an operating knob 60 allowing to adjust, 60 at will, the position of the brushes on the collector 51.

65 Fig. 15 illustrates, by way of example only, an embodiment of a collector constructed by means of independent elements. Each collector is constituted

by two lateral cheek members 61 made of insulating material and axially perforated for the passage of a tubular bolt 62 in which engages the spindle 40 of the rotor, this tubular bolt itself engages in at least one tubular stay 63 holding the cheek members 61 at a suitable distance apart. Said cheek members are provided with arcuate ports 64 arranged substantially according to one and the same circumference and in which engage the ends 65 of blades 66. The width of said blades 66 is greater than that of the ends 65 so that after juxtaposing the various blades, which are held in position by cheek members 61, a cylindrical collector is obtained. 70 75 80

In a modification illustrated in fig. 16, the blades are replaced by a strip 70 curved according to a cylinder and which laterally comprises tongues 71 engaging in some of the ports 64 of the cheek members 61; a rotating contact is thus obtained. 85

Fig. 18 illustrates an assemblage in which use is made of magnets 75. For ensuring sufficient rigidity of this assemblage, whilst avoiding a magnetic short-circuit, it is necessary to provide a unit 76 constituted by members 33a made of brass provided with oblong holes or notches for allowing the same to be secured in position as already indicated. In this assemblage has also been illustrated the member 1 utilised for centering the various parts. 90 95 100

Figs. 19 and 20 show the assemblage of different pole-shoes. In the example of fig. 19, use is made of a member 80 and a U-shaped element 81 the branches of which are divergent. In the example of fig. 20, the branches of element 81 are much longer for constituting the pole-shoes. 105

It will be noted that the double or triple armatures can be replaced, either by a flat ring armature or by a smooth Siemens drum armature, or finally by a slotted drum armature. 110

The assembling member 1 allows of obtaining different diameters by interposing between the cores 7 of the inductors and the bent ends 2 of said member 1, packing pieces of various thicknesses, with a view to compensating for the pole-shoes which have different widths and curvatures in accordance with the diameters of the respective rotors and stators. 115 120

By means of the different arcuate, rectilinear, V-shaped, right-angle or other plates, each end of which is provided with a longitudinal oblong notch, it is possible to construct numerous electric machines and various electric mountings, as 125 130

different electric members accompany the box containing said plates.

It will be noted, as indicated in the preamble to the present application, that the main mechanical difficulties are eliminated, the mechanical assemblage necessitating no particular attention, the only difficulties encountered being solely of electrical order.

It is obvious that the embodiments described and illustrated are given herein only by way of indication and not in a limiting sense.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. Instructive and demonstration apparatus or toy for the construction of various electric machines characterised by the fact that a longitudinal axis and several radial axes are positively determined, said radial axes being at right angles to the longitudinal axis and uniformly distributed about the latter, by means of a member about which are mounted the various outer parts, said member being then removed for allowing the assemblage of the inner apparatus which is thus perfectly centered relatively to the outer unit.

2. Instructive apparatus or toy as claimed in claim 1, characterised by the fact that the removable assembling member determines three axes at right angles to each other and has, for that purpose, the shape of a right angled cross with arms of equal length the ends of which are bent down on one and the same side, the central part being perforated as well as the bent down ends for materializing the three axes above mentioned.

3. Instructive apparatus or toy as claimed in the preceding claims, characterised by the fact that the removable assembling member is combined with external stays allowing the fixed unit to be mounted at a suitable distance from said member.

4. Instructive apparatus or toy as claimed in the preceding claims, charac-

terised by the fact that the main independent elements which, after assemblage, form the fixed unit of the machine or of the assembly, are constituted by rectilinear, arcuate, angularly bent U-shaped or other suitably shaped plates the ends of which are provided with notches or longitudinal oblong holes.

5. Instructive apparatus or toy as claimed in the preceding claims, characterised by the fact that members are also available which allow of constituting interchangeable pole-shoes of different widths and curvatures.

6. Instructive apparatus or toy as claimed in the preceding claims, characterised by the fact that the brushes arranged on either side of a collector partially conform, at their ends, to the cylindrical shape of said collector, the other ends of said brushes being mounted and held stationary on spindles rigid with a member frictionally mounted on a spindle, said member being provided with a toothed wheel meshing with a wheel which can be moved by means of a knob.

7. Instructive apparatus or toy as claimed in the preceding claims, characterised by the fact that each collector is constituted by lateral cheek members made of insulating material axially perforated for the passage of a tubular bolt, said cheek members being provided with ports for the insertion of plates or of a strip curved according to a cylinder and which laterally comprises tongues.

8. Instructive apparatus or toy as claimed in the preceding claims, characterised by the fact that the rotors are constituted by members which are rigidly mountable on the spindle of the rotor and which can be regularly adjusted to alter the diameter of the rotor.

9. Instructive apparatus or toy as described and illustrated with reference to the accompanying drawings.

Dated this 26th day of April, 1939.

DICKER, POLLAK, MERCER,

TENCH & MEYER,

Chartered Patent Agents,

20—23, Holborn, London, E.C.1,

Agents for the Applicant.

Fig. 1.

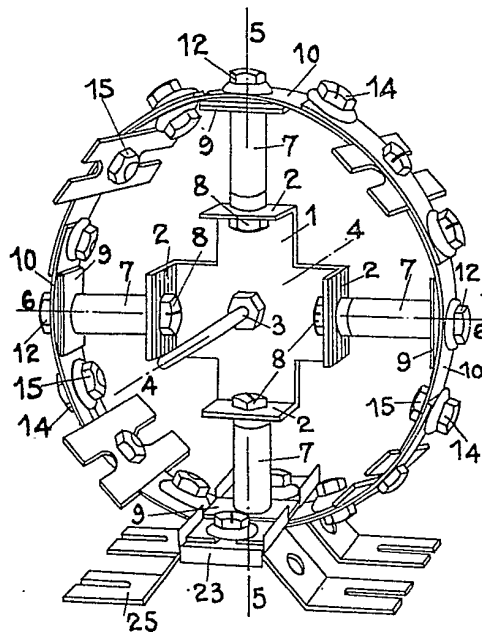


Fig. 2.

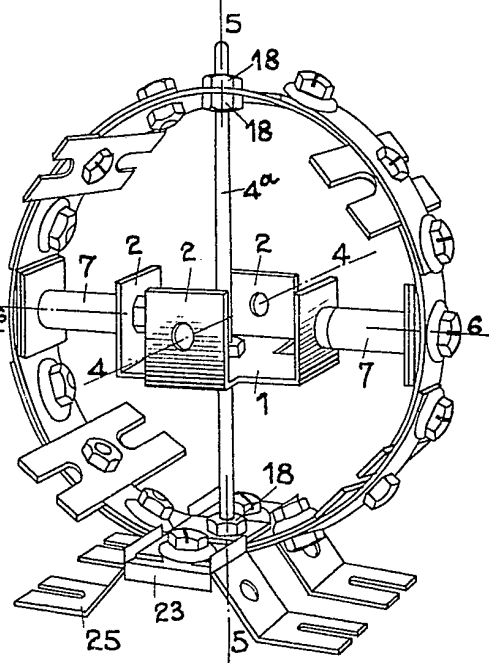


Fig. 3.

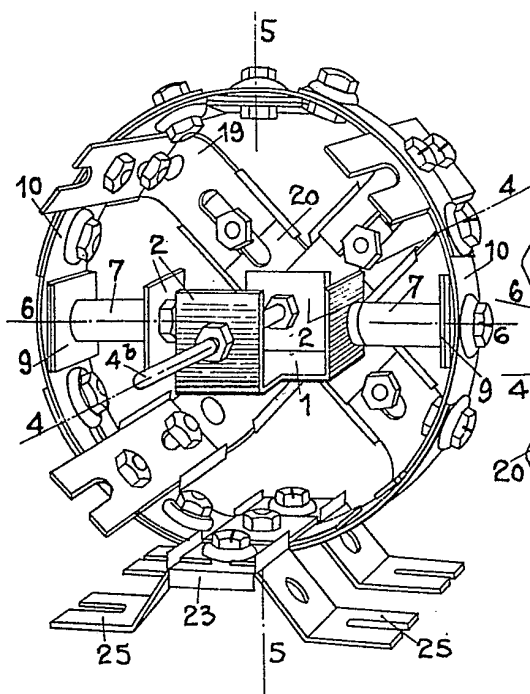
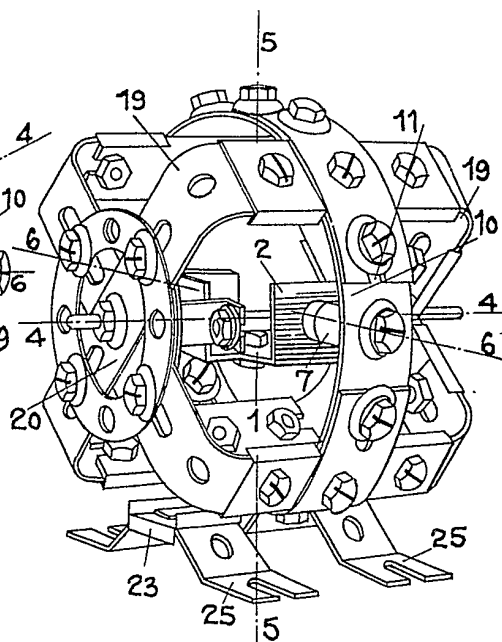


Fig. 4.



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3c  
32  
6

4

Fig. 5.

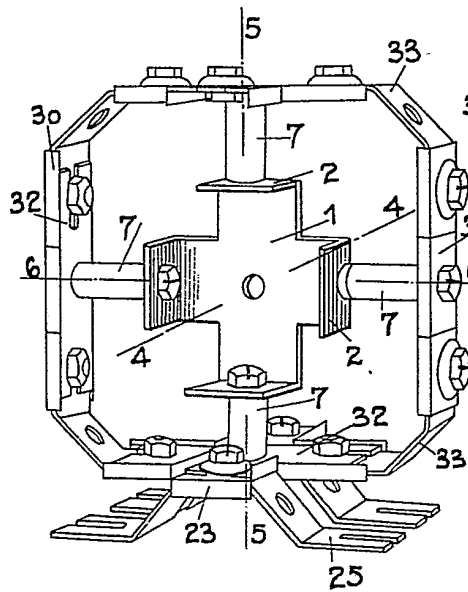


Fig. 6.

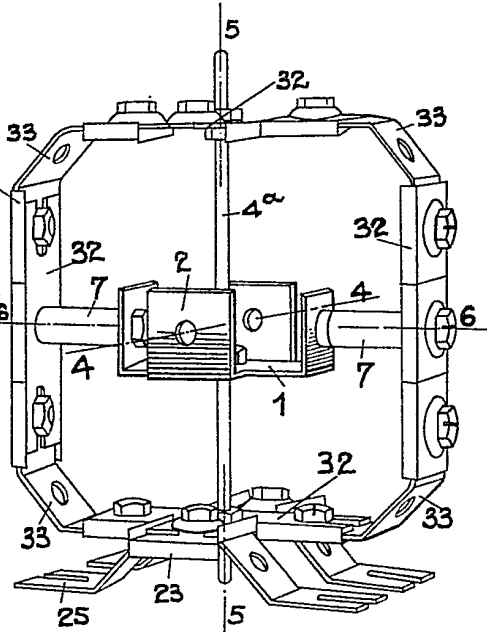


Fig. 7.

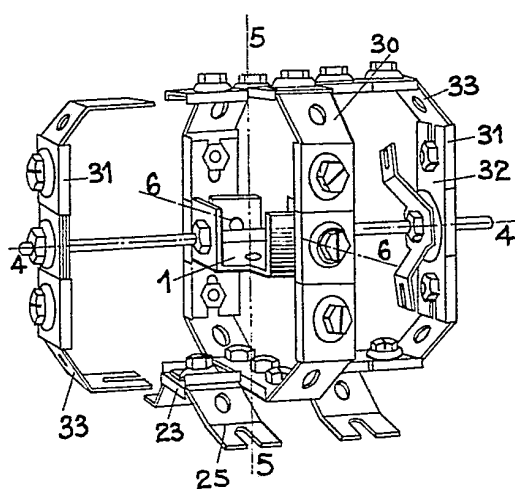


Fig. 8.

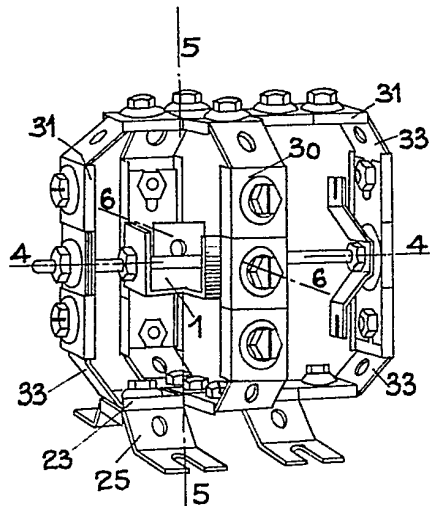


Fig. 1.

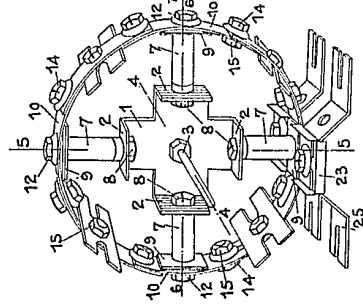


Fig. 2.

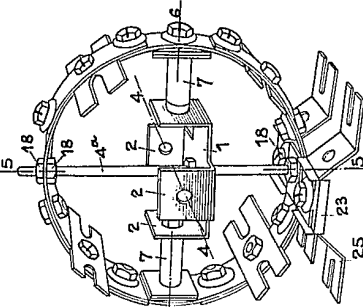


Fig. 3.

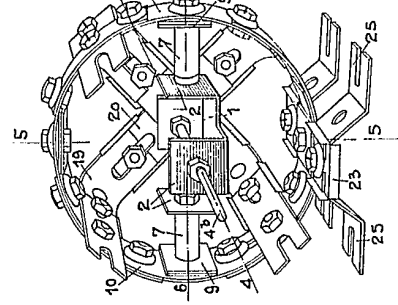


Fig. 4.

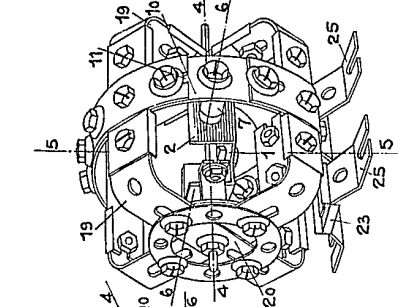


Fig. 5.

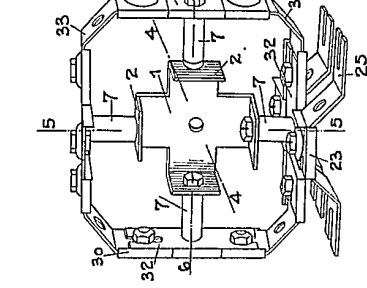


Fig. 6.

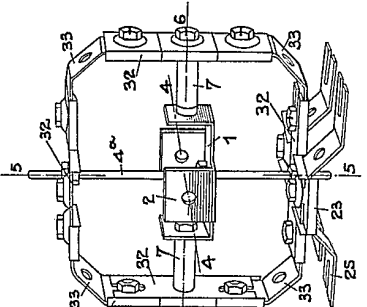


Fig. 7.

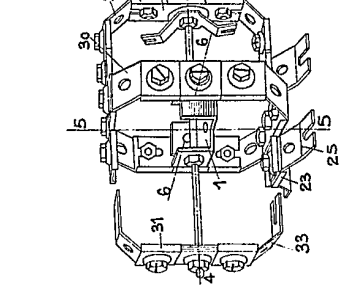
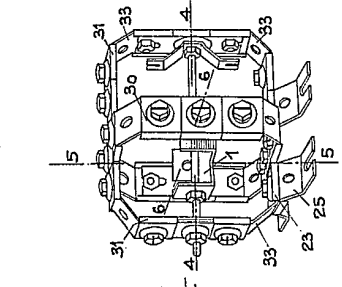


Fig. 8.



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Fig. 9.

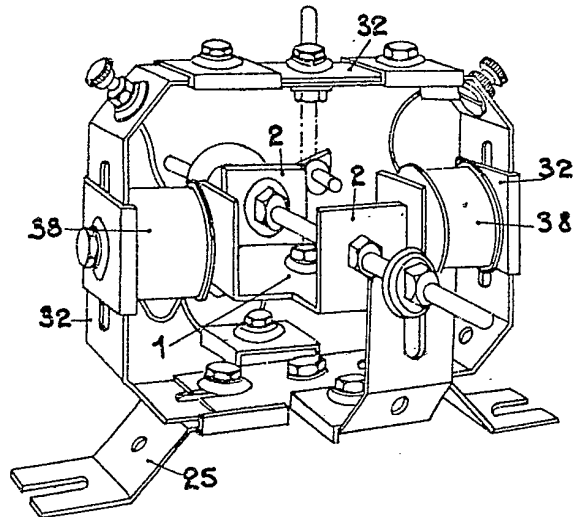


Fig. 10.

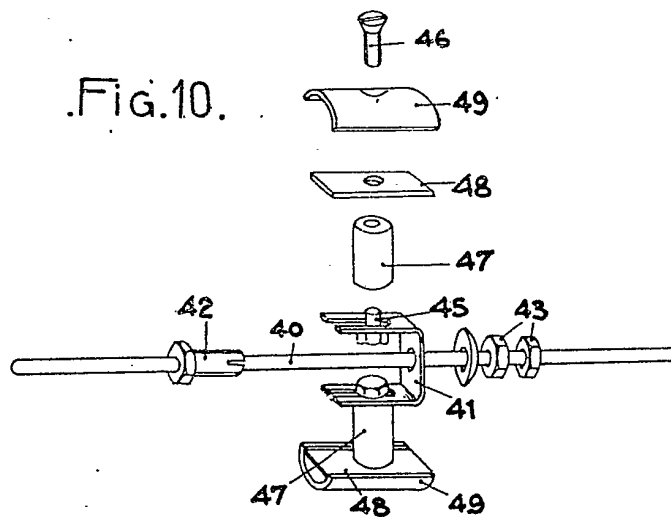
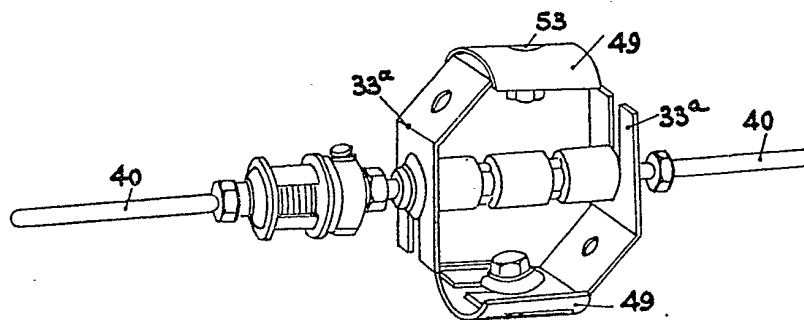


Fig. 13.



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Fig. 11.

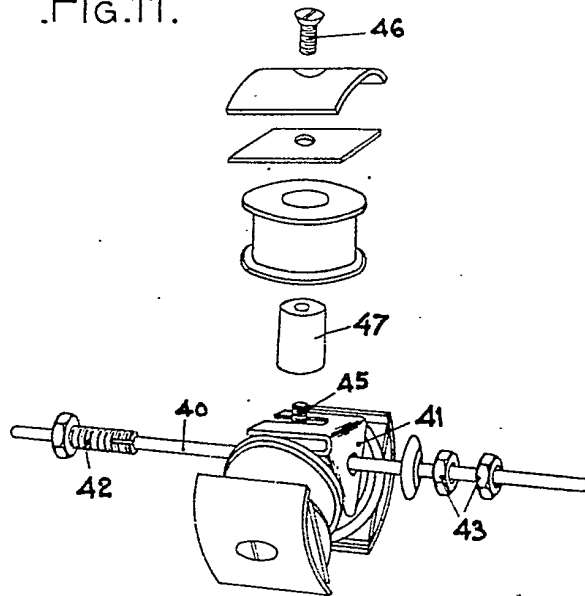


Fig. 12.

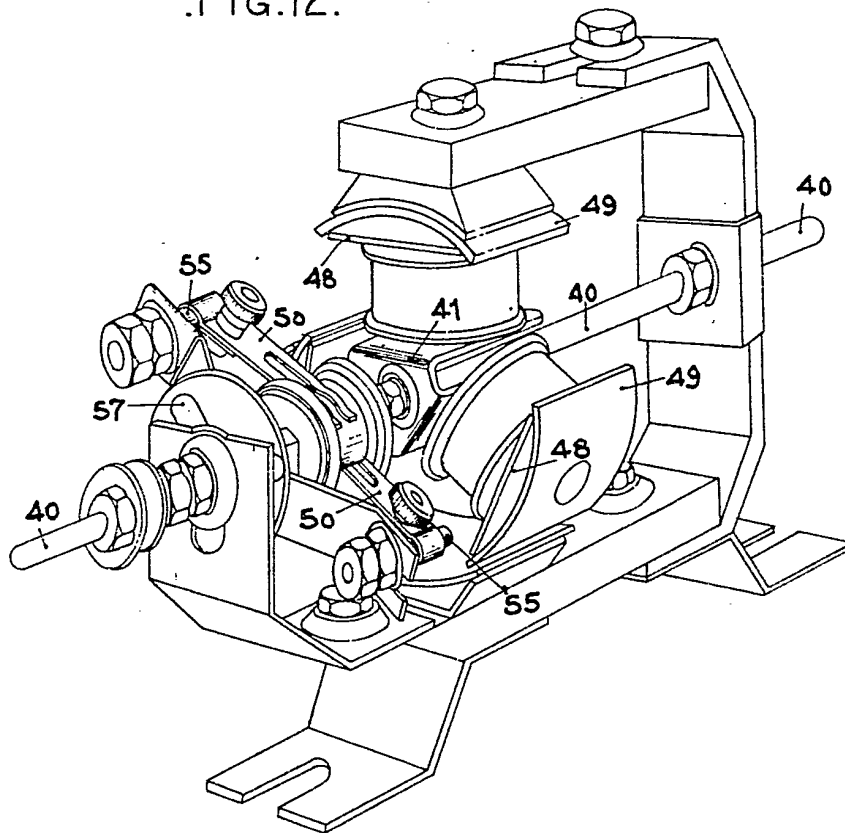


Fig. 9.

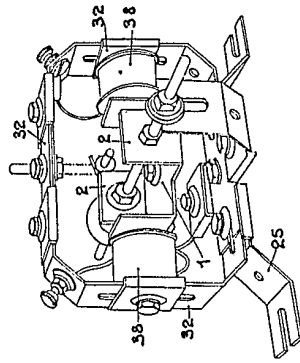


Fig. 10.

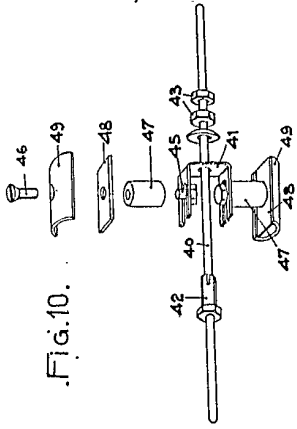


Fig. 13.

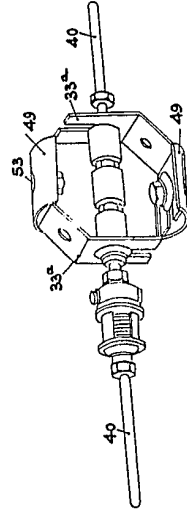


Fig. 11.

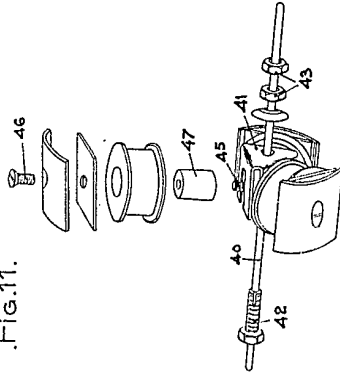
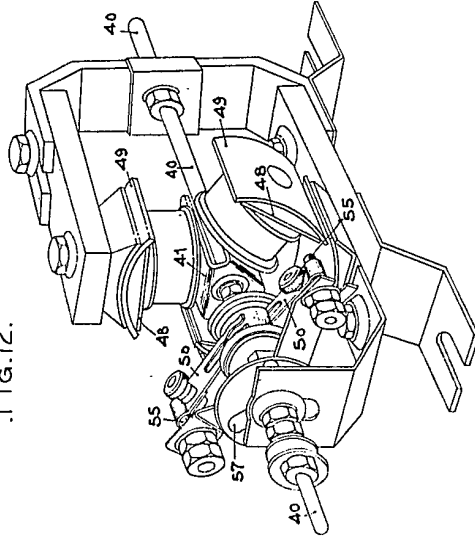


Fig. 12.



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Fig.14.

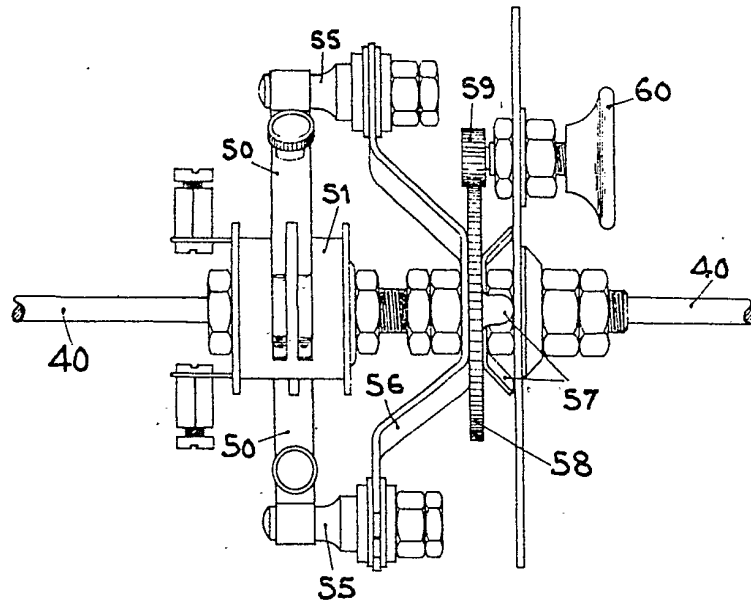


Fig.15.

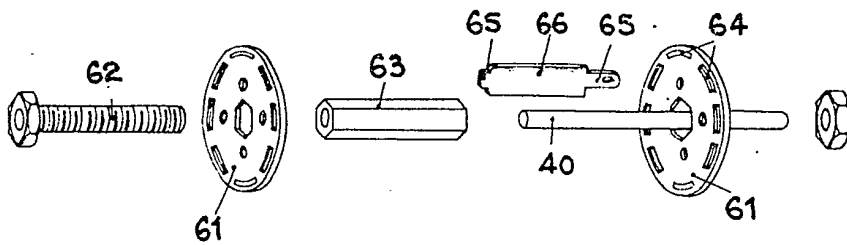


Fig.16.

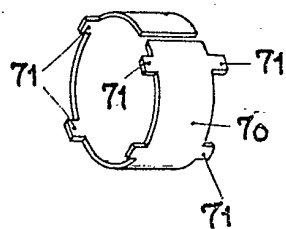
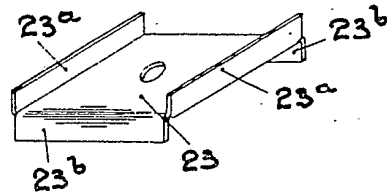


Fig.17.



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Fig. 18.

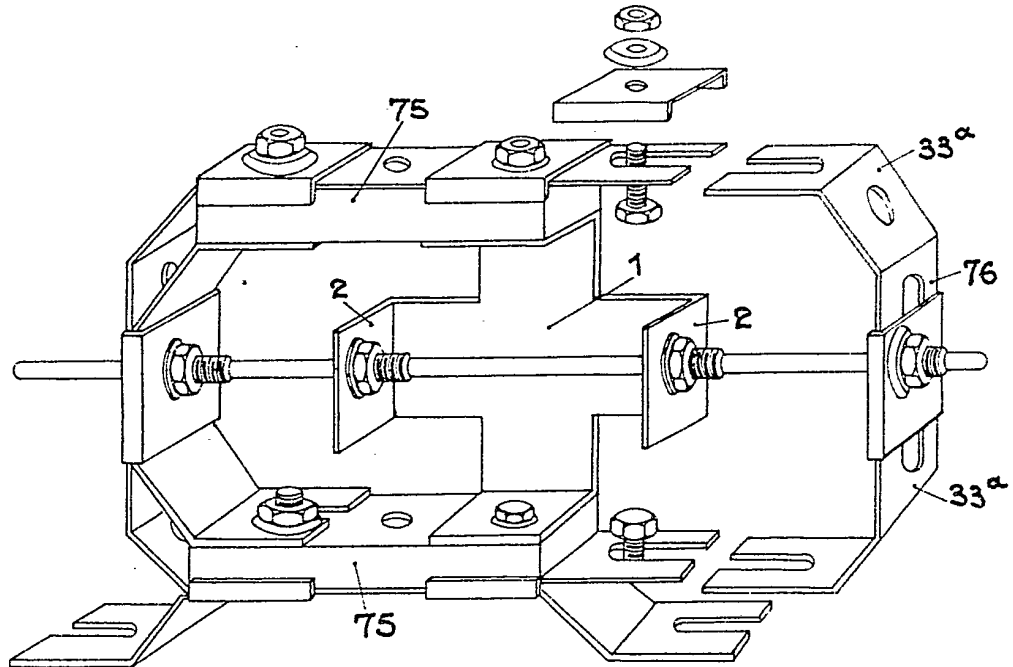


Fig. 19.

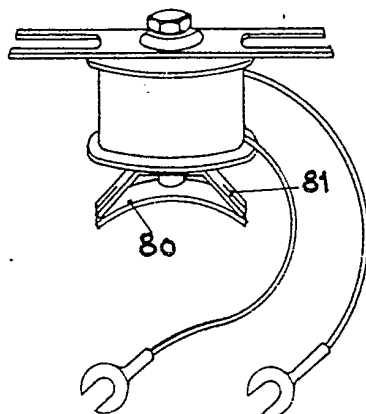


Fig. 20.

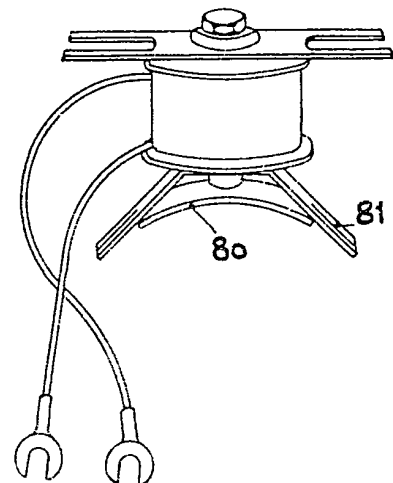


Fig. 14.

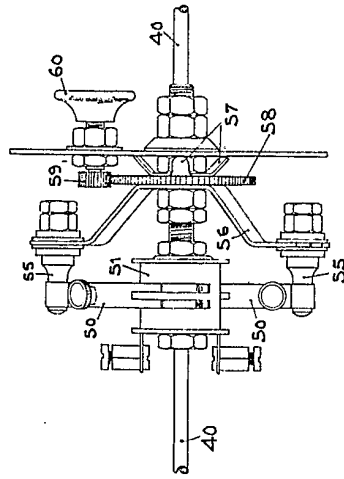


Fig. 15.

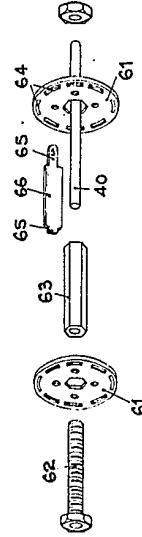


Fig. 16.

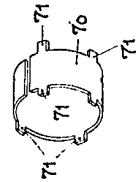


Fig. 17.

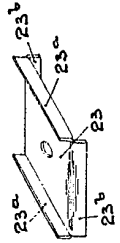


Fig. 18.

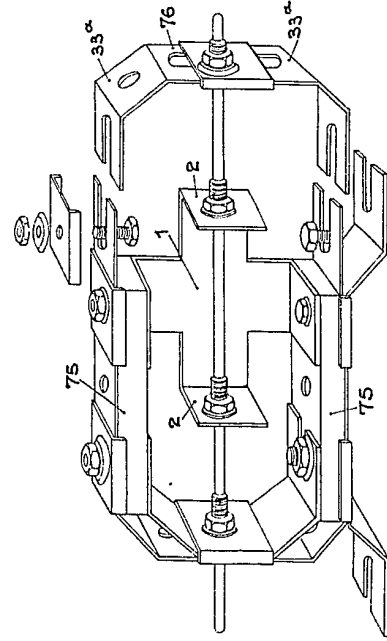


Fig. 19.

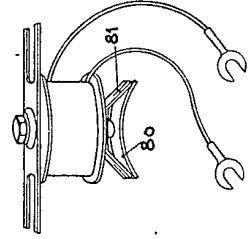
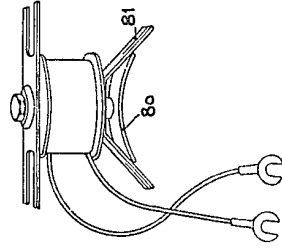


Fig. 20.



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