

Nov. 26, 1935.

G. CARBONARO

2,022,367

HORN

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2 Sheets-Sheet 1

Fig. 1.

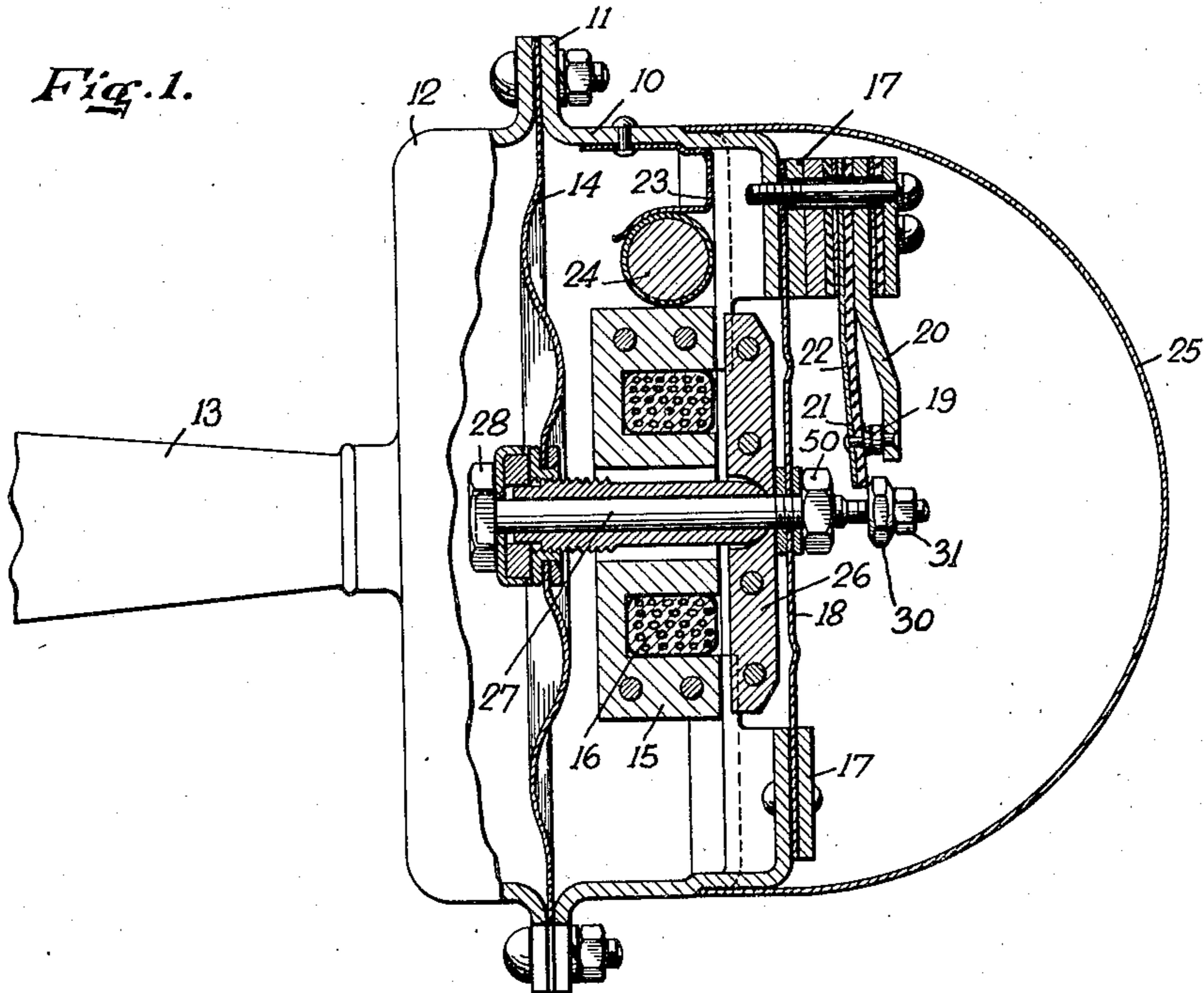
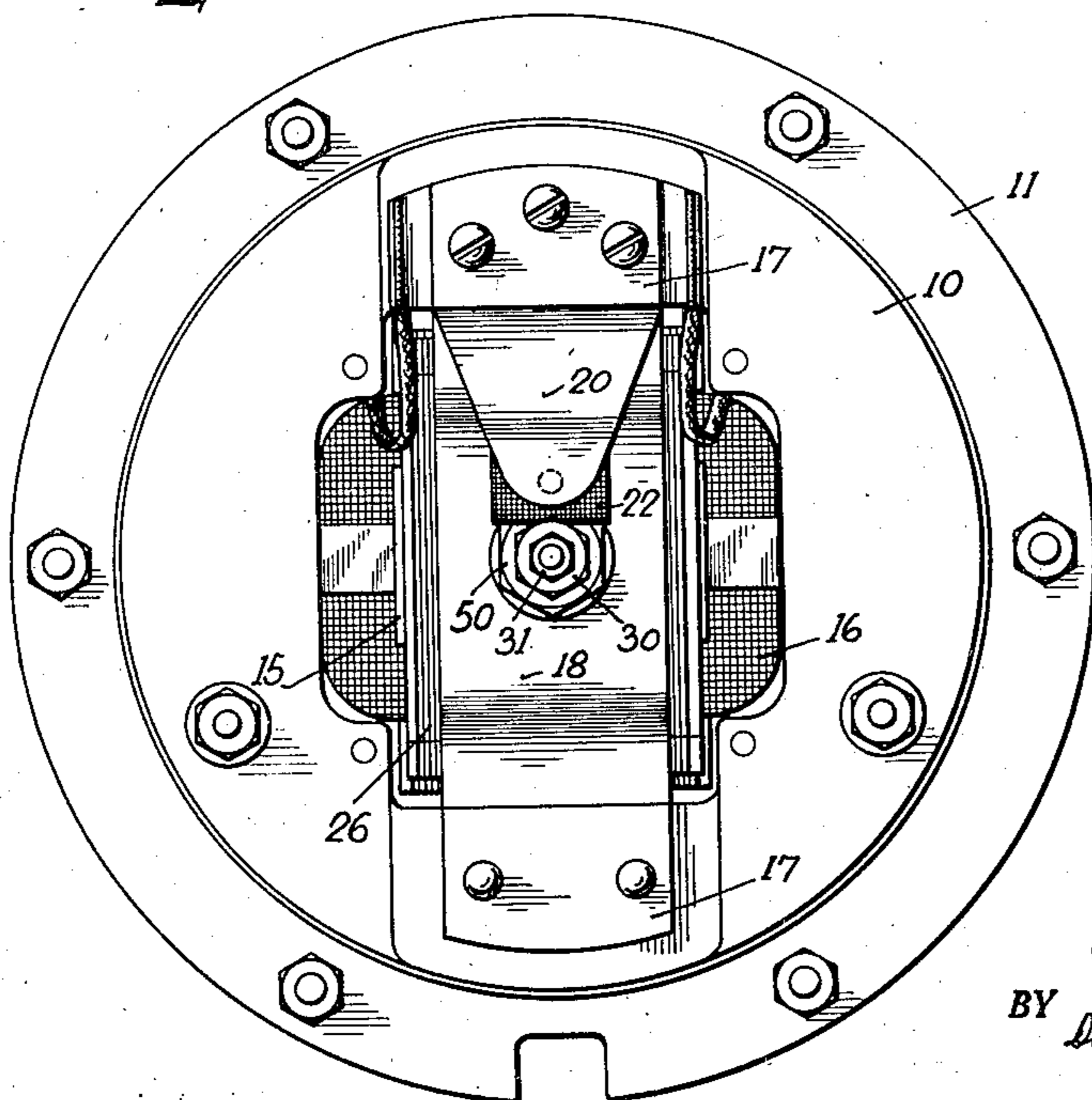


Fig. 2.



INVENTOR.
GAETANO CARBONARO,
BY *Duell, Dunn & Anderson.*
ATTORNEYS.

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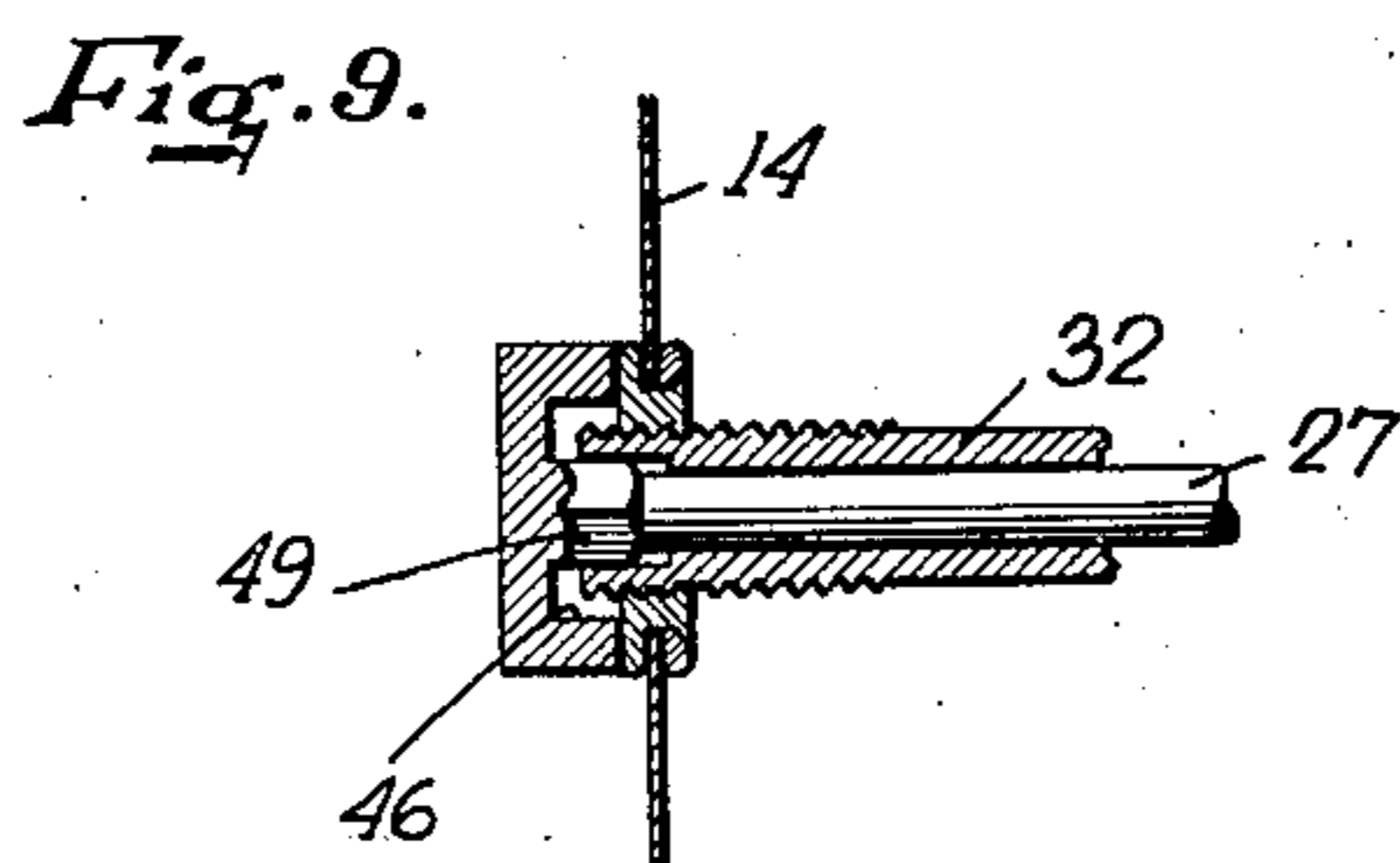
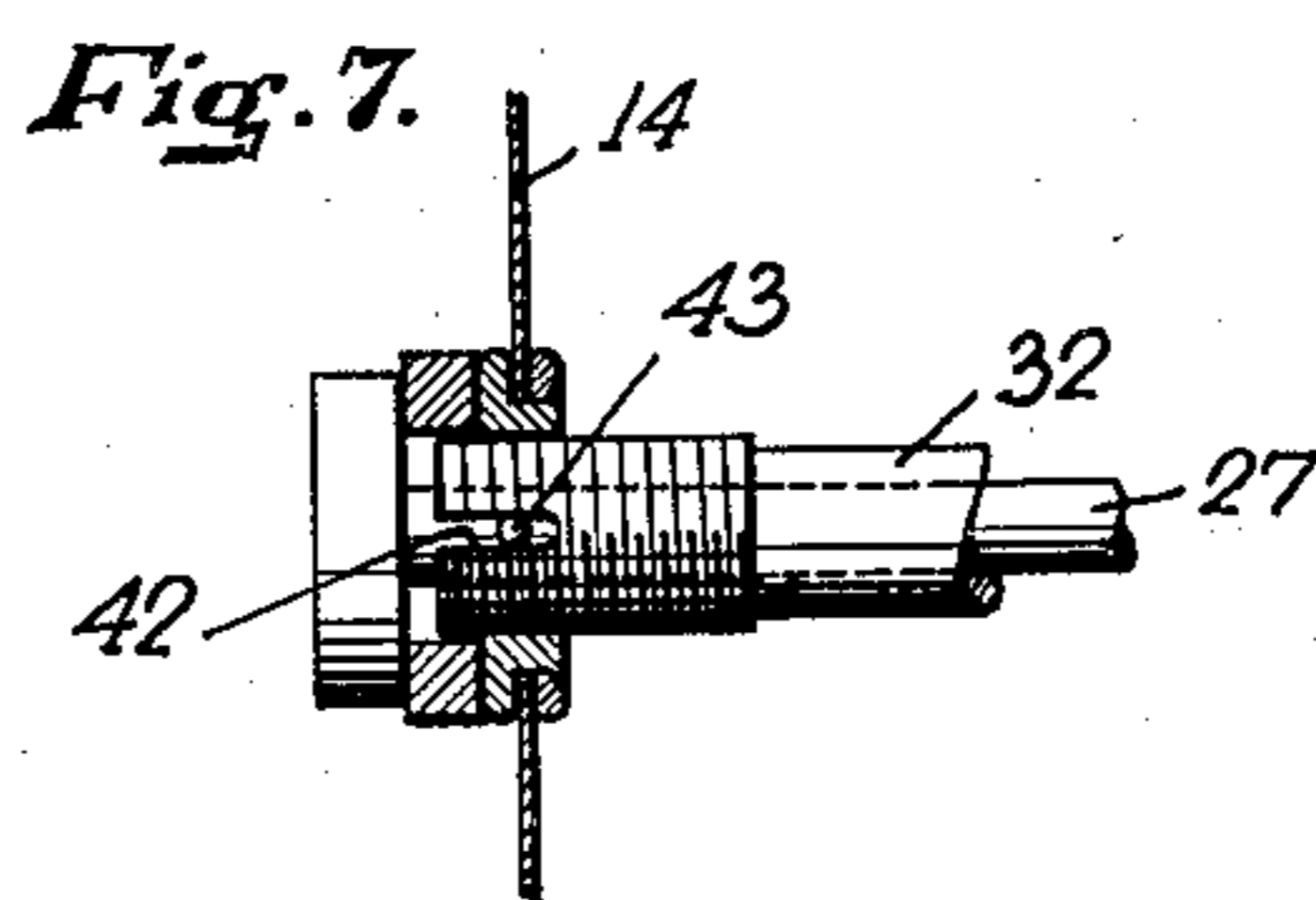
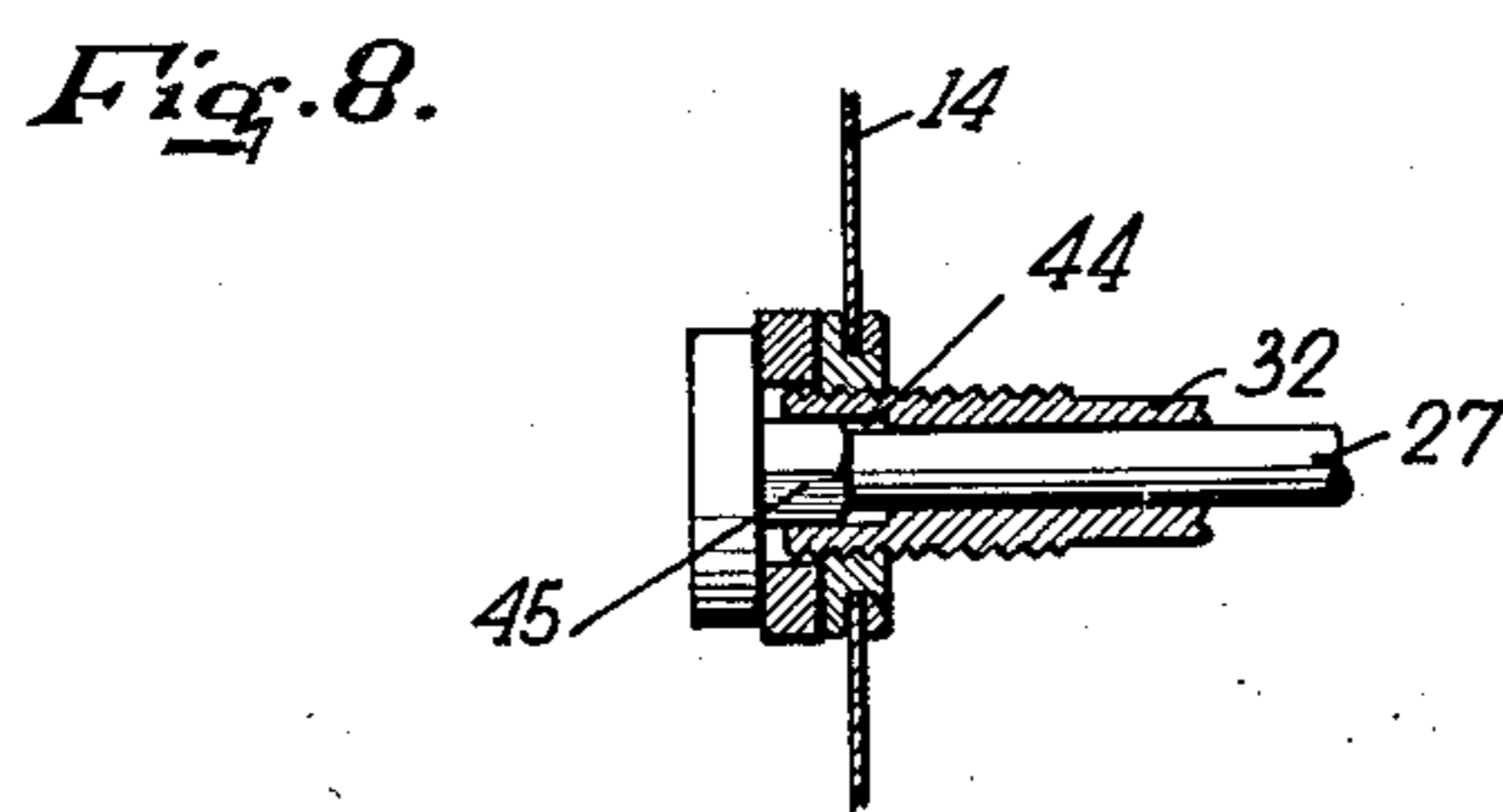
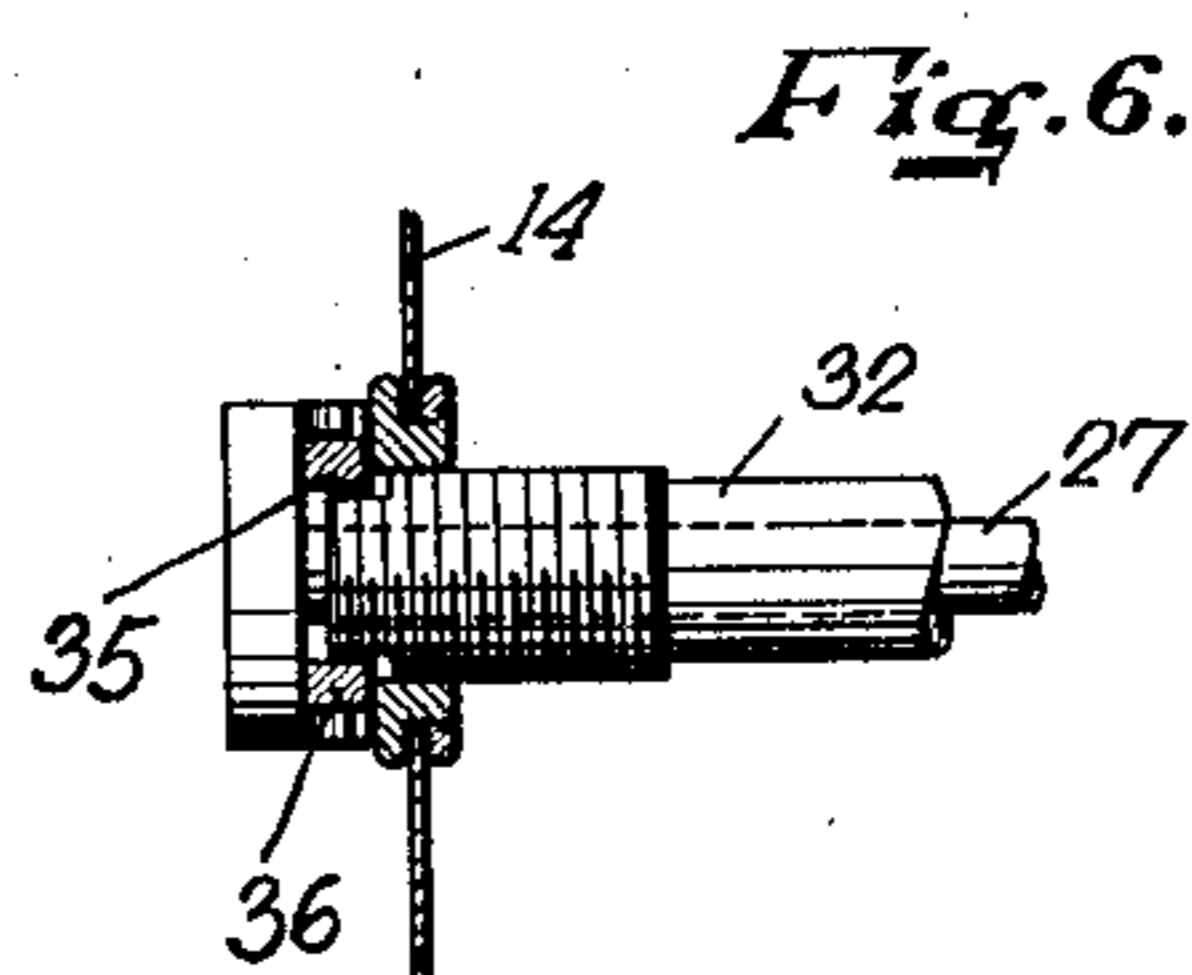
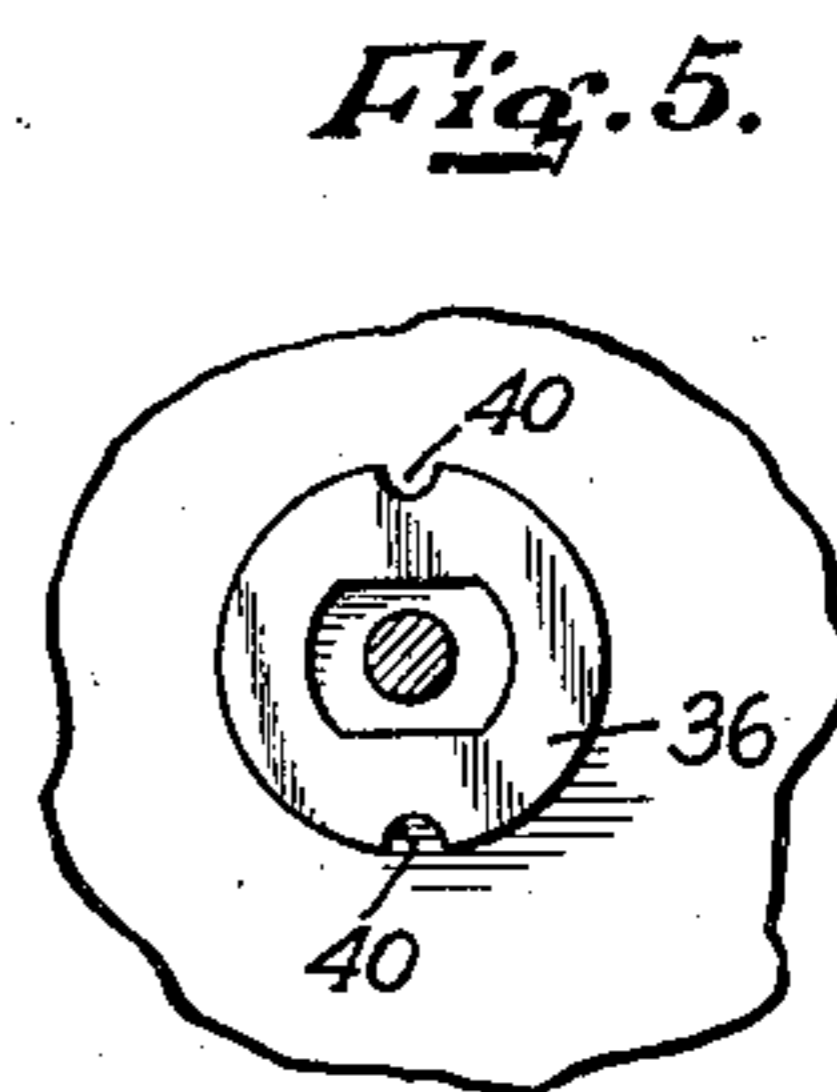
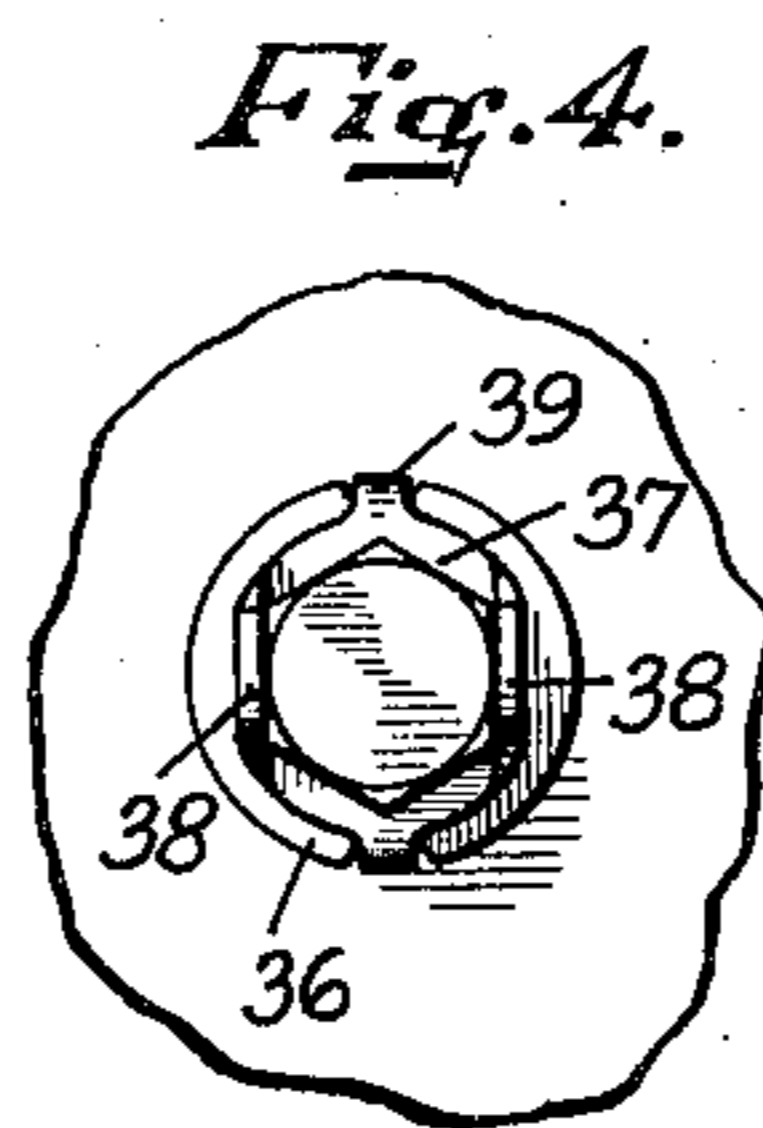
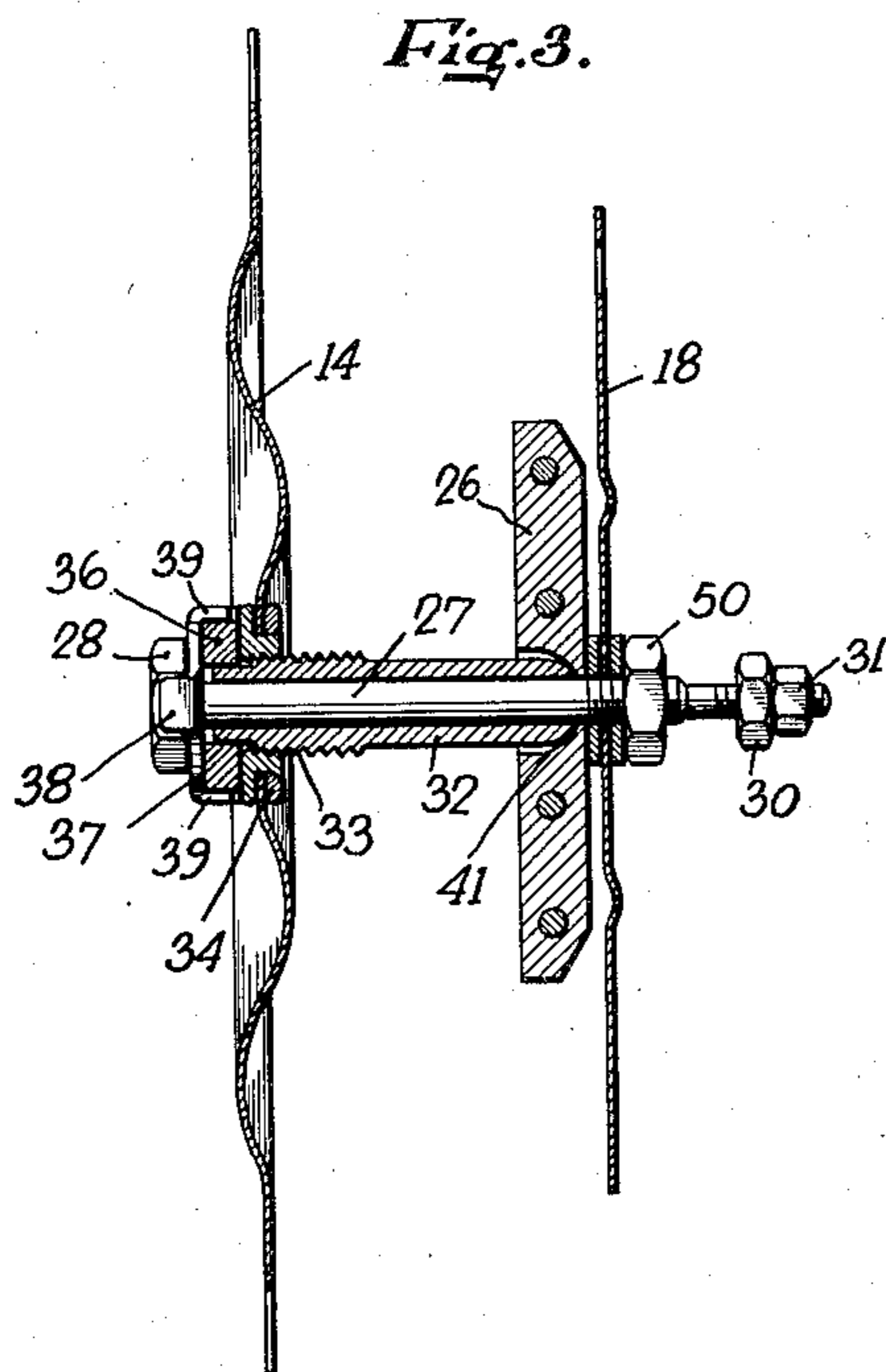
G. CARBONARO

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2 Sheets-Sheet 2



INVENTOR.
GAETANO CARBONARO,
BY *Luell, Dunn & Anderson.*
ATTORNEYS.

UNITED STATES PATENT OFFICE

2,022,367

HORN

Gaetano Carbonaro, Brooklyn, N. Y., assignor to
E. A. Laboratories, Inc., Brooklyn, N. Y., a cor-
poration of New York

Application March 7, 1934, Serial No. 714,414

8 Claims. (Cl. 177—7)

This invention relates to a structurally and functionally improved diaphragm—and diaphragm actuator adjustment. While the present invention may be employed in numerous different associations, it is primarily intended for use in connection with horns and especially horns of the magnetic or vibratory type.

It is a well appreciated fact in connection with diaphragm horns that considerable difficulty has been experienced in adjusting the diaphragm actuator. More especially it has been customary in the construction of horns to secure the diaphragm to an actuating stem which, in one manner or another, was associated with an armature or which was otherwise reciprocated. In certain instances it was found that with the parts assembled, the diaphragm occupied a somewhat distorted position when in a condition of rest. Thereupon it was necessary to adjust the point of connection between the diaphragm and actuator so that the former might occupy a proper neutral position. This condition has occurred rather infrequently, but a quite common condition which existed was with the parts assembled and where an armature was utilized, it would be found that the armature was not quite properly positioned with reference to the electromagnet. While a certain amount of compensation could be provided by shifting the circuit breaker or circuit breaker actuator, it has been necessary—in order to secure satisfactory results—for the parts to be dis-assembled and the actuating stem to be adjusted with reference to the diaphragm, so that consequently the armature secured to the stem would be adjusted with reference to the diaphragm. Thereupon the parts would be assembled and it might again be found that not quite the proper adjustment had been secured, and the work would have to be done over again. A further difficulty has occurred that frequently when such adjustments were made, the parts, when re-assembled, would permit of a certain amount of play between the actuating stem and the diaphragm, resulting in a distorted and unpleasant sound when the horn was operated.

With the foregoing in mind the present invention aims to provide a novel and improved structure by means of which the position of the actuating stem may be readily adjusted with reference to the diaphragm, so as to relieve strains on the latter.

A further object is that of furnishing a mechanism of this nature by means of which the position of the armature with reference to the elec-

tromagnet may readily be adjusted and without the necessity of dis-assembling the parts.

A still further object is that of furnishing a mechanism in which either or both of these adjustments may be made without there being any danger of play coming into being between the several parts.

Still another object is that of furnishing a structure such as the foregoing, and which structure will embody relatively few parts, each individually simple and rugged in design, and which parts may be readily assembled and adjusted by an operator in order to secure the most perfect results.

With these and other objects in mind, reference is had to the attached sheets of drawings which illustrate practical embodiments of the invention, and in which—

Fig. 1 is a sectional side view of one form of horn embodying the present improved structure of the present invention;

Fig. 2 is an end view thereof;

Fig. 3 is a view similar to Fig. 1, but showing merely certain of the parts by means of which the adjustment is secured;

Fig. 4 is a fragmentary face view of the structure as shown in Fig. 3;

Fig. 5 is a view similar to Fig. 4, but showing a portion of the underlying mechanism;

Fig. 6 is a fragmentary elevation illustrating certain of the parts shown in the preceding figures; and

Figs. 7, 8 and 9 are views similar to Fig. 6, but showing various alternative forms of structure which may be employed.

Referring primarily to Figs. 1 and 2, it will be seen that the numeral 10 indicates a mounting, to the flange 11 of which a casing 12 may be secured. As is customary in horn structure, the casing is extended in the form of a trumpet 13, which may be either integral with, or otherwise secured to the casing, and between the latter and the mounting a diaphragm 14 may be clamped. The mounting 10 also serves to support an electromagnet 15, which may have a coil 16 to provide a suitable field, and this mounting may also support clamps 17 between which a spring 18 extends. A circuit breaker may be mounted beyond one of the clamps, and this element may conveniently include a contact 19 carried by a fixed arm 20, and with which contact a contact 21 secured to a spring arm 22 cooperates. The contacts 19 and 21 are, of course, arranged in series with a source of electrical current supply and with the coil 16, and when these contacts

are engaged it is obvious that the electromagnet will be energized to attract the armature 26 while de-energization will follow upon the contacts being separated. A clip 23 may also be secured to the mounting and serve to retain a condenser 24 in compactly housed position therein, it being understood that an element of this nature is desirable in a horn of the vibratory type, and that to enclose and protect this mechanism, a housing 25 may be frictionally or otherwise attached to the mounting member.

The foregoing represents a more or less customary form of horn structure, and is intended merely for the purpose of illustrating one preferred embodiment of the invention. It will hereinafter be obvious that the invention may be employed in connection with horns embodying various other structures.

Thus, referring to the figures just considered, as well as to Figures 3 to 6 inclusive, it will be noted that an actuating stem 27 extends between and beyond the diaphragm and armature. This stem may terminate at its outer end in the form of a bolt head 28 while its inner end is reduced as at 29 beyond its point of connection with the armature and spring. The reduced end portion of the stem mounts a nut 30, together with a lock nut 31, the former serving to cooperate with the movable spring arm 22 of the circuit breaker to thus constitute an adjustable actuator for the same. It is, of course, obvious that in lieu of these units any other suitable unit might be employed, or that the parts could be re-arranged to otherwise secure an actuation of the circuit breaker.

Enclosing the actuating bolt or stem 27 is a sleeve 32, which has screw threaded connections as at 33 with the diaphragm bushing 34. At a point adjacent its outer end the sleeve is reduced or has interrupted portions 35, especially shown in Fig. 6, and a washer 36 of fibre or other suitable material is formed with a central opening conforming to this portion of the sleeve, so that relative rotation of the parts is precluded. Interposed between the bolt head 28 and the washer 36 is a connecting member comprising in the present exemplification a body 37 having ears 38 which are extended outwardly in contact with the faces of the head 28. This body also has inwardly extending portions 39 which lie in notches 40 formed in the washer. In this manner it will be obvious that if the stem or bolt 27 is turned, such rotation will be transmitted to the washer 36 and by the latter to the sleeve 32. It will be noted that the depth of the washer is just sufficient to accommodate the reduced end portion of the sleeve when the latter is fully projected. Consequently the latter may be retracted without in any manner affecting the co-operation of the parts. Such retraction will necessarily occur as the stem or bolt is turned, for the reason that the sleeve, in rotating, will engage with its threads and the threads of the bushing 34 to effect this result. However, the longitudinal shifting of the sleeve which results will in no wise prevent or destroy the intimacy of contact of the several parts, for the reason that the washer will remain in firm contact with the outer face of the bushing and the bolt will remain in such position that it properly thrusts against the body 37 and in turn against the outer face of the washer.

The armature simply has sliding contact with the stem or bolt 27. However, the end of the sleeve 32 may be rounded as at 41, to seat in a

correspondingly rounded recess in the armature, so that a sleeve centering structure is provided at this point. Obviously, as rotation of the bolt or stem is resorted to, the resultant shifting of the sleeve longitudinally with respect to the diaphragm will cause, first a release of any buckling tendency or tensioning strain on the diaphragm, but, more important than this, will cause the armature (in the embodiment illustrated) to be shifted with respect to the electromagnet. This entire adjustment is effected from the rear of the horn by simply rotating the rear end of the bolt or stem by employing a suitable wrench or screw-driver. Thus, a manufacturer may readily assemble the parts, and only afterwards, and prior to the attachment of the casing 25, need he adjust these parts to assure, first, a proper condition on the part of the diaphragm, secondly, a proper positioning of the armature with reference to the electromagnet, and, thirdly, a shifting of the nut or other circuit breaker actuator so that proper actuation of the parts follows.

In the form of structure shown in Fig. 7, the same effect is secured by having the sleeve 32 formed with an end notch 42, within which a pin 43 secured to the bolt or stem 27 rides. By this construction it is obvious that the bolt head may be round, and that the connecting elements 37-39 may be dispensed with. This connecting element may also be dispensed with in the form of mechanism shown in Fig. 8, in which, by simply having the outer end of the sleeve counter-bored, as at 44, and irregularly shaped to conform to the correspondingly shaped shoulder 45 of the bolt or stem, a rotation of the latter will cause corresponding rotation of the sleeve and a shifting of this element. It is also feasible to dispense entirely with the washer 36. One form of structure permitting of this result is shown in Fig. 9, in which, in addition to the construction shown in Fig. 8, there is provided a recess 46 in the head 49 of the stem or bolt, and which recess is of sufficient depth to allow of the shifting of the sleeve.

In all of these several forms of construction it will, of course, be appreciated that by simply tightening the nut 50, the parts are maintained in properly assembled condition. In other words, the sleeve is caused to bear against the armature; the bolt is drawn rearwardly to a maximum extent; the bolt is prevented from turning accidentally; and thus no longitudinal shifting of the sleeve with respect to the diaphragm may occur. Consequently, as a prerequisite to any adjustment, this nut, or its equivalent, must be loosened.

As afore brought out, numerous changes in construction and rearrangement of the parts may be resorted to without departing from the spirit of the invention as defined by the claims. It will also be understood that as a result of the afore described structures there is achieved, among others, the objects specifically afore noted.

Having thus fully described the invention, what is claimed as new and desired to be protected by Letters Patent is:

1. In a horn, a diaphragm, an armature, a sleeve having one of its ends connected to said armature, screw-threads forming a part of said sleeve, said diaphragm being formed with an opening for the passage of said sleeve, means associated with the diaphragm for coupling the same to said sleeve threads, a bolt extending within the bore of said sleeve and beyond the ends of the same, said bolt being slidable with-

in said sleeve and means for coupling said bolt with said sleeve against rotation with respect to each other.

2. In a horn, a diaphragm, an armature, a sleeve having one of its ends connected to said armature, screw-threads forming a part of said sleeve, said diaphragm being formed with an opening for the passage of said sleeve, means associated with the diaphragm for coupling the same to said sleeve threads, a bolt extending slidably within the bore of said sleeve and beyond the ends of the same, and means disposed adjacent said diaphragm for coupling the ends of said sleeve and bolt and securing the same against rotation with respect to each other.

3. In a horn, a diaphragm, an armature, a sleeve having one of its ends connected to said armature, screw threads forming a part of said sleeve, said diaphragm being formed with an opening for the passage of said sleeve, means associated with the diaphragm for coupling the same to said sleeve threads, a bolt extending within the bore of said sleeve and beyond the ends of the same, means disposed adjacent said diaphragm for coupling said bolt and sleeve against rotation with respect to each other, and means forming a part of said coupling means whereby during simultaneous rotation of said bolt and sleeve elements, they may shift longitudinally with respect to each other.

4. In a horn, a diaphragm, an armature, a sleeve having one of its ends connected to said armature, screw threads forming a part of said sleeve, said diaphragm being formed with an opening for the passage of said sleeve, means associated with the diaphragm for coupling the same to said sleeve threads, a bolt extending within the bore of said sleeve and beyond the ends of the same, means disposed adjacent said diaphragm for coupling said bolt and sleeve against rotation with respect to each other, means forming a part of said coupling means whereby during simultaneous rotation of said bolt and sleeve elements said sleeve may shift longitudinally with respect to said bolt, and means for preventing longitudinal shifting of such bolt.

5. In a horn, a diaphragm, an armature, a sleeve having one of its ends connected to said armature, screw-threads forming a part of said sleeve, said diaphragm being formed with an opening for the passage of said sleeve, means associated with the diaphragm for coupling the same to said sleeve threads, a bolt extending within the bore of said sleeve and beyond the ends of the same, a head forming a part of such bolt, a non-circular end portion forming a part of said sleeve, and means slidably connected to such end portion of said sleeve and non-

rotatably coupled with said bolt head whereby, when the opposite end of said bolt is rotated, said sleeve will rotate therewith and simultaneously shift longitudinally of the bolt body and transversely of the diaphragm.

6. In a horn, a diaphragm, an armature, a sleeve having one of its ends connected to said armature, screw-threads forming a part of said sleeve, said diaphragm being formed with an opening for the passage of said sleeve, means associated with the diaphragm for coupling the same to said sleeve threads, a bolt extending within the bore of said sleeve and beyond the ends of the same, a non-circular portion forming a part of said sleeve and disposed adjacent said diaphragm, and means for coupling the end of said bolt with the non-circular sleeve portion to prevent relative rotation of said sleeve and bolt elements while permitting relative longitudinal shifting thereof whereby, upon the opposite end of said bolt being turned, said sleeve will turn simultaneously therewith and shift transversely of said diaphragm and longitudinally of said bolt.

7. In a horn, a diaphragm, an armature, a sleeve having one of its ends connected to said armature, screw-threads forming a part of said sleeve, said diaphragm being formed with an opening for the passage of said sleeve, means associated with the diaphragm for coupling the same to said sleeve threads, a bolt extending within the bore of said sleeve and beyond the ends of the same, said sleeve being formed with a slot extending longitudinally thereof, and a pin secured to said bolt and riding with said slot whereby, upon said bolt being turned, said sleeve will rotate with the same and with respect to said diaphragm and will shift transversely with reference to the latter and longitudinally of said bolt.

8. In a horn, a diaphragm, an armature, a sleeve having one of its ends connected to said armature, screw-threads forming a part of said sleeve, said diaphragm being formed with an opening for the passage of said sleeve, means associated with the diaphragm for coupling the same to said sleeve threads, a bolt extending within the bore of said sleeve and beyond the ends of the same, said sleeve being formed with an irregular shaped bore adjacent one of its ends, a correspondingly irregular shaped bolt portion lying within such bore and slidable with respect to the same whereby, upon such bolt being turned, said sleeve will turn simultaneously with respect to the same and with respect to said diaphragm and will shift transversely of the latter and longitudinally of such bolt.

GAETANO CARBONARO.