

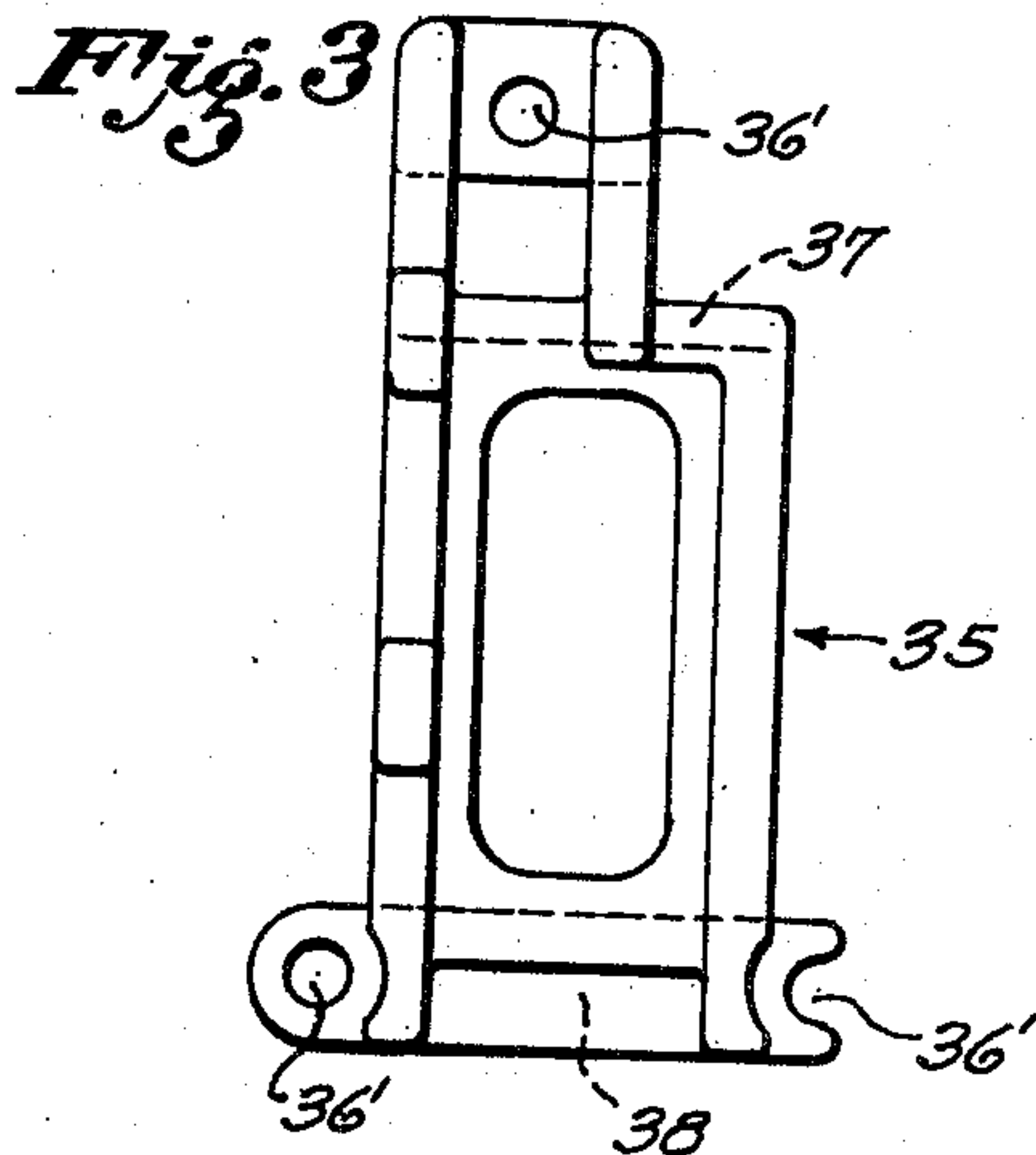
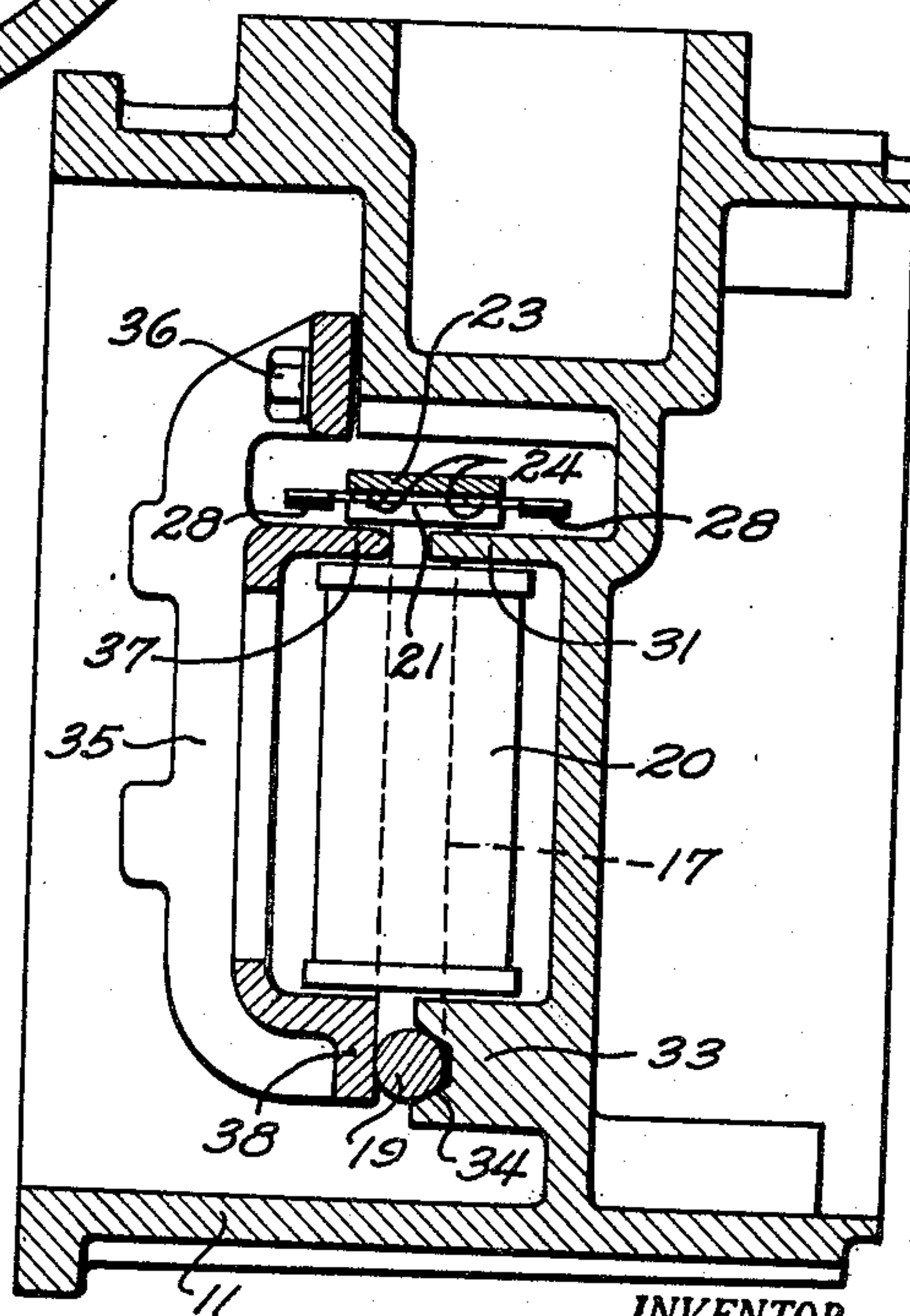
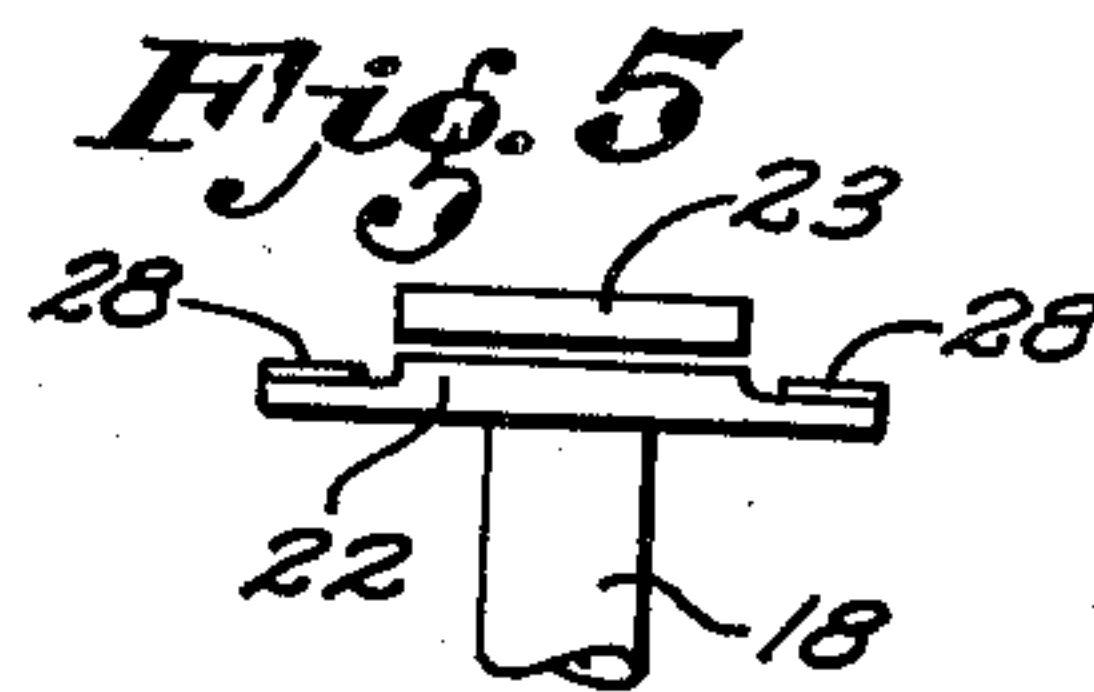
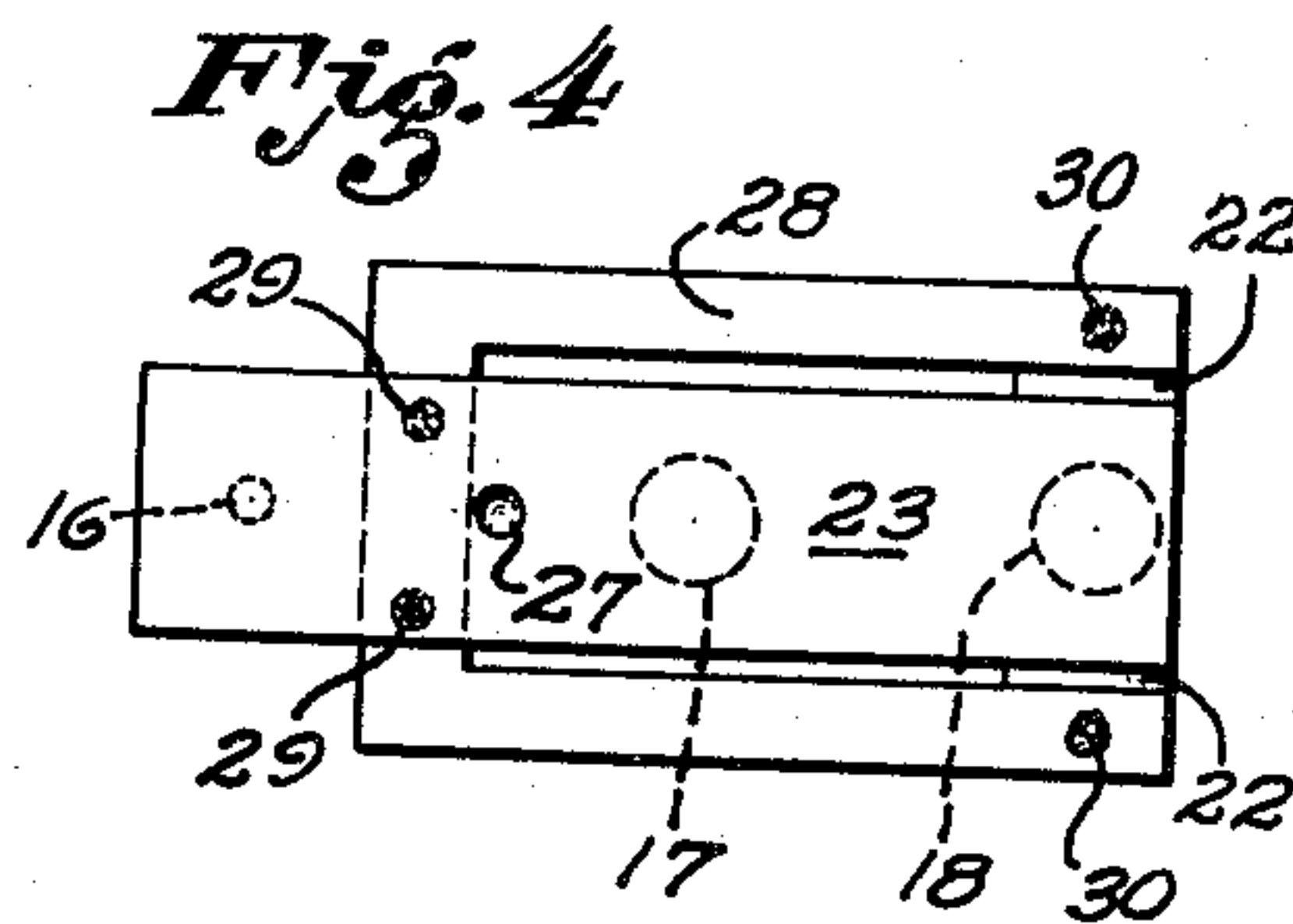
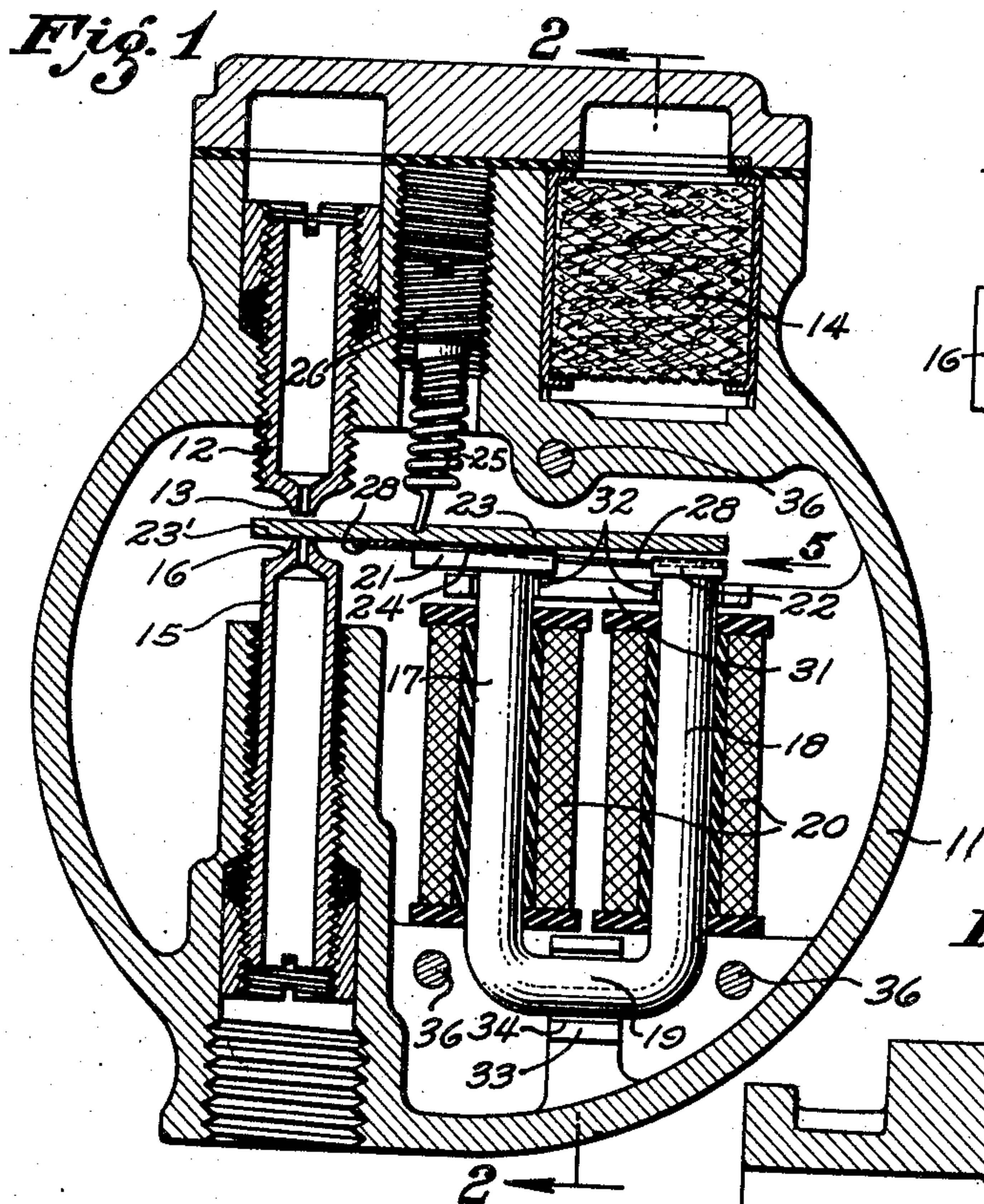
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ELECTROMAGNETIC OPERATOR AND MOUNT THEREFOR

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ELECTROMAGNETIC OPERATOR AND MOUNT THEREFOR

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7 Claims. (Cl. 317-165)

This invention relates to electromagnetic operators of the type which comprise a U-shaped core, and an armature rockably mounted on one of the side arms of the core and having a portion adjacent the other side arm for attraction theretoward.

It is an object of this invention to provide improved and frictionless means for maintaining the armature in position relative to the core and for guiding the armature in its operative movements.

Another object of the invention is to provide an improved mount for an electromagnet of the type described.

For full understanding of the invention, and further appreciation of its features and advantages, reference is to be had to the following detailed description and accompanying drawing, and to the appended claims.

In the drawing:

Figure 1 is a sectional view of an electromagnetic operator embodying this invention;

Figure 2 is a section taken generally along the line 2-2 of Fig. 1;

Figure 3 is a plan of the electromagnet clamp member indicated at 35 in Fig. 2;

Figure 4 is a detail plan showing the armature 23 and the U-shaped strip 28 for holding the armature in place on the electromagnet core; and

Figure 5 is a fragmentary view taken in the direction of the arrow 5 in Fig. 1.

In Figs. 1 and 2 of the drawing there is shown a sensitive electromagnetically operated three-way pilot valve especially adapted for controlling the operation of a diaphragm valve; the general arrangement being similar to that shown in my Patent No. 2,294,693. The structure of Figs. 1 and 2 is one part or section of an improved valve organization which may include the thermal-relay section shown in my copending application Serial No. 364,805 filed June 29, 1953, now Patent No. 2,734,564, granted Feb. 14, 1956.

In Figs. 1 and 2 the numeral 11 indicates a cup-shaped housing whose open end is, in practice, closed by means (not shown) defined in part by the valve diaphragm so that the interior of housing 11 forms a pressure chamber into which fluid (such as fuel gas) can pass by way of a hollow member 12, threaded in an opening in the side wall of the housing, when the tip or jet 13 of the member is unobstructed as shown; a filter 14 being arranged in the path of flow to member 12. Mounted opposite member 12 is a similar hollow member 15 whereby the pressure chamber is vented when the jet 16 of this member is open.

For controlling flow through the pilot-valve jets 13, 16 there is an electromagnetic operator which comprises a U-shaped core, formed of round metal, having a pair of side arms 17 and 18 and a cross arm 19. Around both of the side arms of the core is an energizing coil 20. On the free ends of the side arms 17 and 18, and substantially integral therewith, are pole pieces 21 and 22, respectively; pole pieces 21 being extended in a direction away from the other side arm 18 as can be seen in Fig. 1, and pole piece 22 extended laterally of the plane of

the side arms as can be seen in the fragmentary view of Fig. 5. Bridging the pole pieces 21, 22 is an armature 23 having a portion 23' which extends between the jets 13, 16 and serves as a closure therefor. Armature 23 is fulcrumed on the pole piece 21 by means of a knife-edge projection 24 integral with the armature and preferably of two-piece construction as can be seen in Fig. 2.

When the electromagnet is unenergized, as shown, the armature is tilted counterclockwise into engagement with jet 16 by the force of a compression spring 25 mounted on an adjusting screw 26 in the side wall of the housing and having a straight end portion whose tip bears in a shallow depression 27 (see Fig. 4) in the top surface of the armature between fulcrum 24 and jet 16.

When the electromagnet is energized the right-hand end of armature 23 is attracted toward pole piece 22 so that the closure portion 23' is rocked out of engagement with jet 16 and into engagement with jet 13 to effect venting of the fluid within the housing.

For guiding armature 23 in its operative movements there is a U-shaped strip 28 of material such as phosphor bronze which, in practice, may have a thickness of about 0.006 inch. This strip is rigidly attached by its cross arm to the underside of the armature at a point thereon adjacent jets 13, 16, and by the free ends of the side arms of the strip to the laterally-extended portions of pole piece 22, as is best seen in Figs. 4 and 5; the strip conveniently being spot-welded to the parts at the four points indicated in Fig. 4 by numerals 29 and 30. The strip 28 provides an effective but relatively-frictionless support and guide for the armature, and is nearly balanced at either side of the armature fulcrum 24 so that only slight flexure of the strip occurs in operation of the armature.

The mount for the electromagnet comprises an elongated narrow support 31 projecting integrally from the floor of housing 11 and having a pair of generally V-shaped notches 32 (Fig. 1) receiving portions of the side arms 17, 18 of the core adjacent their free ends, and another support 33 having a similar notch 34 receiving a substantial part of the cross arm 19. For clamping the core in place there is a member 35, shown per se in Fig. 3, which is secured to the housing by three screws 36, passing through openings 36' in the clamp member, and has an elongated narrow projection 37 in register with support 31 and engaging the core side-arms 17, 18, and another projection 38 engaging the cross arm 19. By the mount of this invention the electromagnet is held exactly in a predetermined position so that assembly of the electromagnetic operator is facilitated.

The specific embodiment of my invention herein shown and described is obviously susceptible of modification without departing from the spirit of the invention, and I intend therefore to be limited only by the scope of the appended claims.

I claim as my invention:

1. In an electromagnetic operator of the type which comprises a U-shaped core having a pair of side arms whose polar end surfaces lie generally in a plane at right angles to the plane of the core, a substantially flat armature rockably mounted on one of said side arms and having a portion facing the polar surface of the other of the side arms for attraction in a direction theretoward; and a spring biasing said armature in an opposite direction; means for continuously guiding said armature consisting of a generally flat U-shaped strip of thin resilient material, said strip being arranged generally in said plane of the polar surfaces of said core and so that the side arms of the strip are at opposite sides of the side arms of the core, means rigidly attaching the ends of the side arms of the strip to said other side arm of the core, and means rigidly attaching the cross arm of the strip to said armature at a point thereon spaced from said one side

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arm of the core in a direction away from the other side arm of the core; said guiding strip being constructed and arranged so that it does not significantly influence the biasing of the armature by said spring.

2. The combination defined in claim 1, and wherein said means for attaching the side arms of said strip to said core comprises a lateral extension of said other of the side arms of the core.

3. A mount for an electromagnet having a U-shaped core and a coil wound around a medial part of at least one of the side arms of the core, comprising: a base member having portions terminating generally in a plane and adapted to engage said core only at points thereon adjacent the extremity of each of its side arms and at a point generally at the middle of the cross arm of the core, and means for clamping said core in engagement with said base portions.

4. A mount for an electromagnet having a U-shaped core formed by a pair of side arms and a cross arm, and a coil wound around a medial part of at least one of said side arms, comprising: a base member having portions adapted to engage one side of said core relative to the plane of said arms, and only at points on said one side adjacent the free end of each of said side arms and at a point generally at the middle of said cross arm; a clamp member having portions adapted to engage the opposite side of said core at points thereon opposite said first-mentioned points; and means for securing said clamp member in position.

5. A mount for an electromagnet as defined in claim 4, and wherein at least one of said members is recessed to receive part of said core arms at said points.

6. A mount for an electromagnet having a U-shaped core of substantially round material providing a pair of side arms and a cross arm, and a coil wound around a

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medial part of at least one of said side arms, comprising: a base member having portions adapted to engage one side of said core relative to the plane of said arms, and only at points on said one side adjacent the free end of each of said side arms and at a point generally at the middle of said cross arm; a clamp member having portions adapted to engage the opposite side of said core at points thereon opposite said first-mentioned points; the core-engaging portions of at least one of said members defining generally V-shaped notches for the core arms; and means for securing said clamp member in position.

7. A mount for an electromagnet having a U-shaped core of substantially round material providing a pair of side arms and a cross arm, and a coil wound around a medial part of at least one of said side arms, comprising: a base member having a pair of projections terminating substantially in a plane; one of said projections being elongated and narrow and having a pair of generally V-shaped notches adapted to receive and support said side arms of the core at points closely adjacent the free ends thereof, the other of said projections having a generally V-shaped notch for supportingly receiving a medial portion of said cross arm; a clamp member having a pair of projections conforming to and facing said base-member projections; and means for securing said members together with said core clamped therebetween.

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