No. 616,519. Patented Dec. 27, 1898.

W. K. BASSFORD, JR.

MOLD FOR FORMING ARMATURE COILS.

(Application filed July 27, 1898.)

(No Model.) 3 Sheets—Sheet 1.

Fig 1

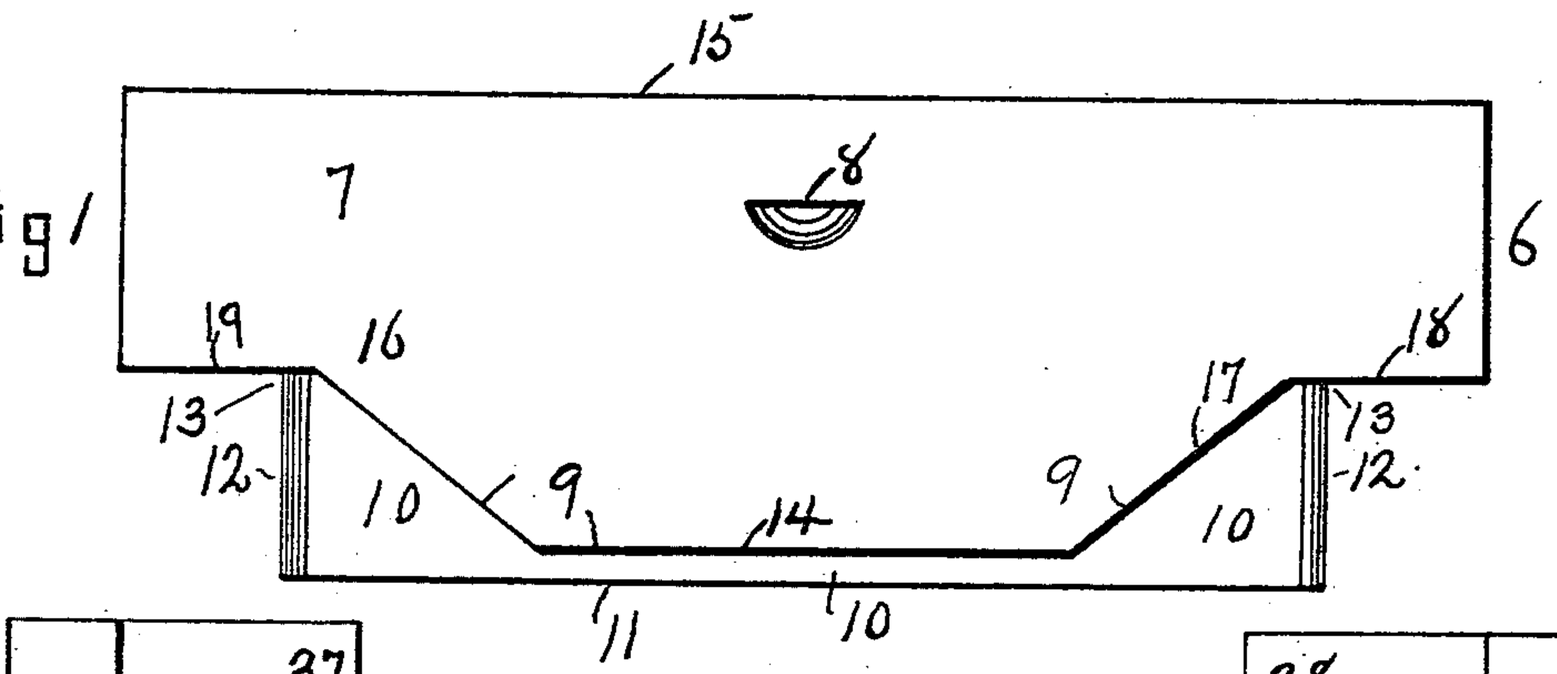

Fig 2

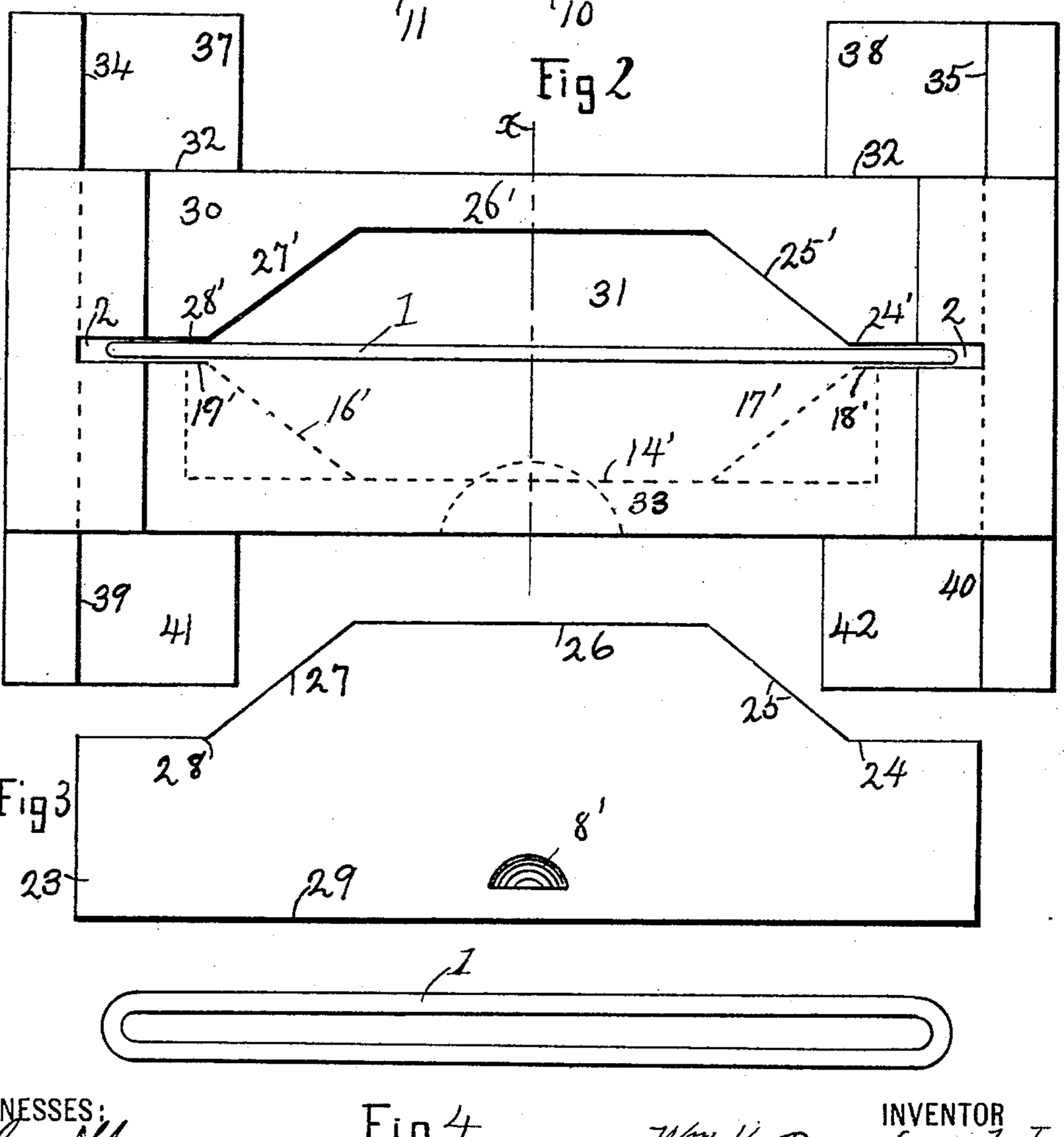

Fig 3

Fig. 4

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Fig 8

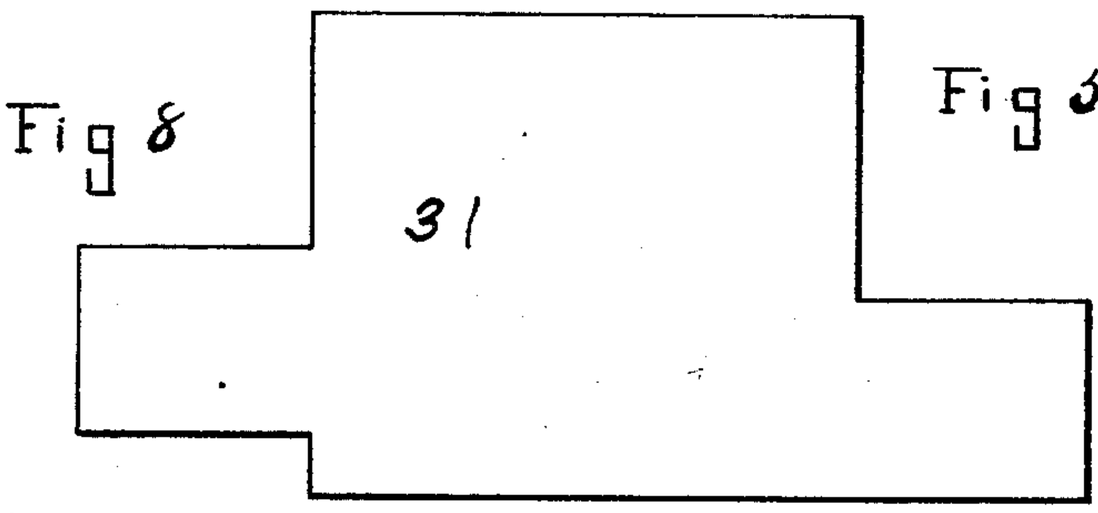


Fig 5

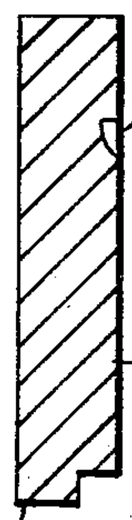


Fig 6

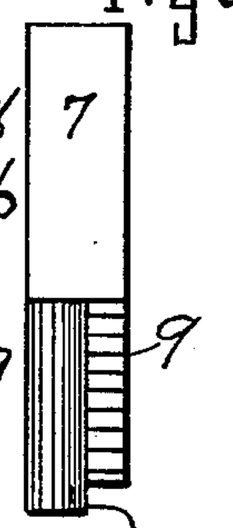
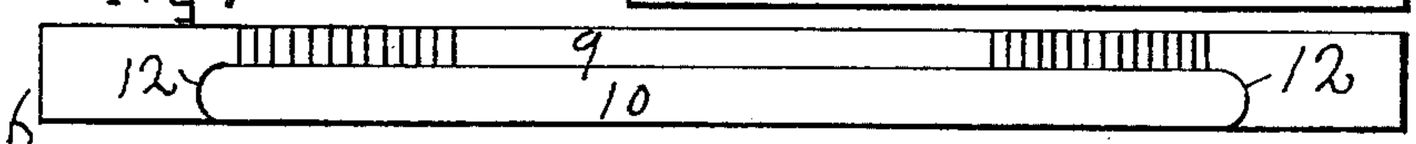


Fig 7



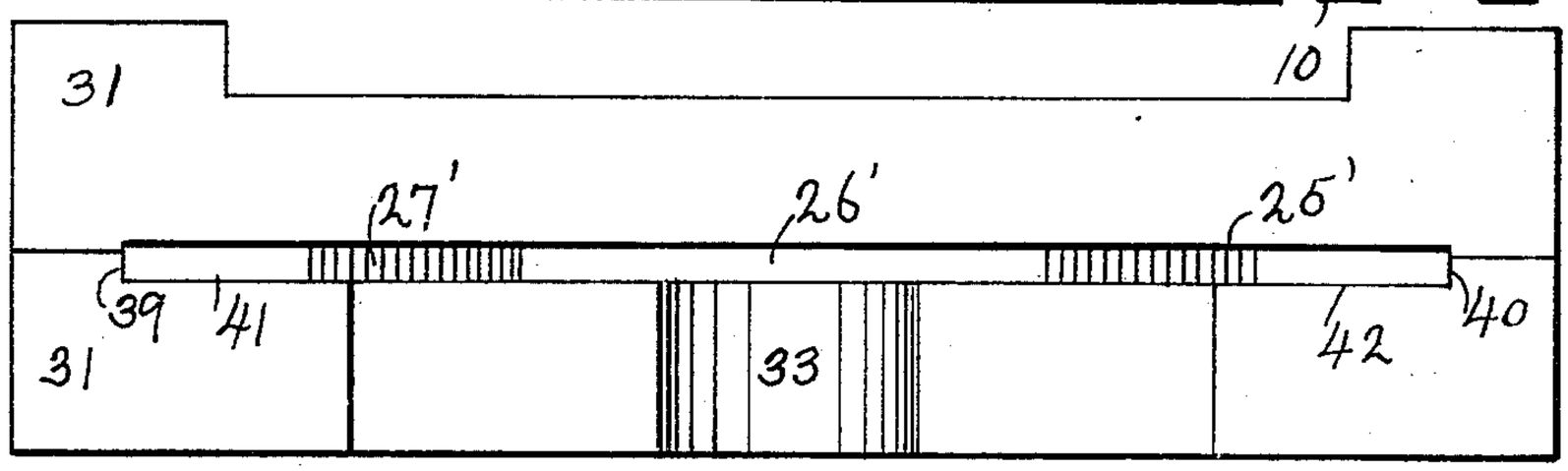


Fig 9

Fig 10

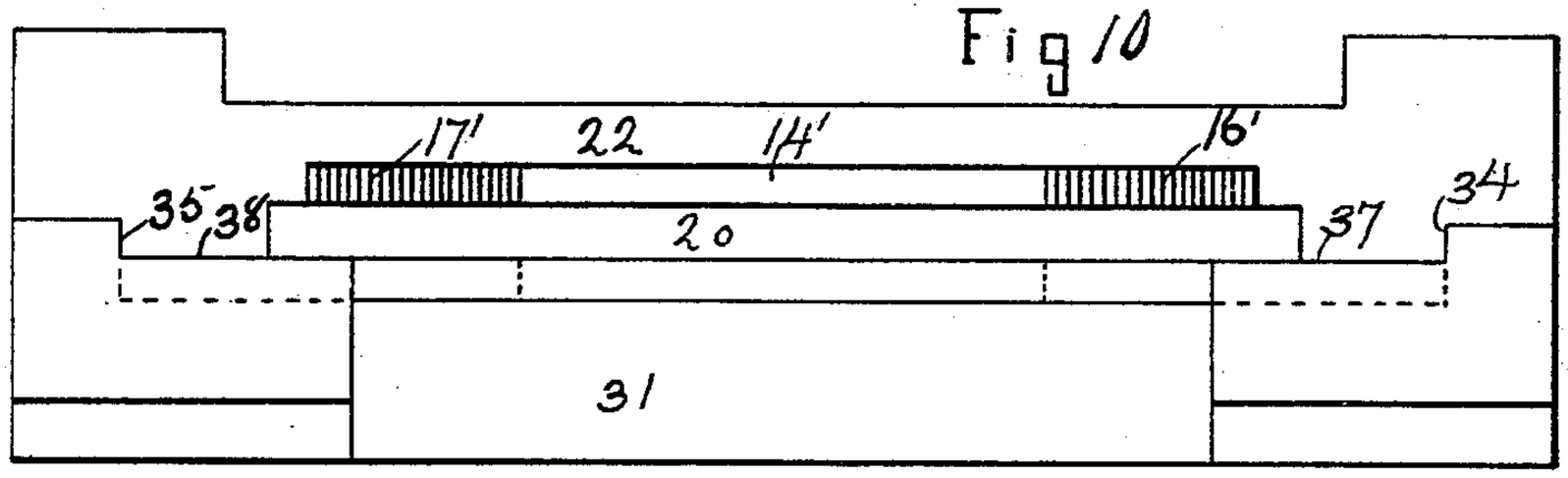


Fig 11

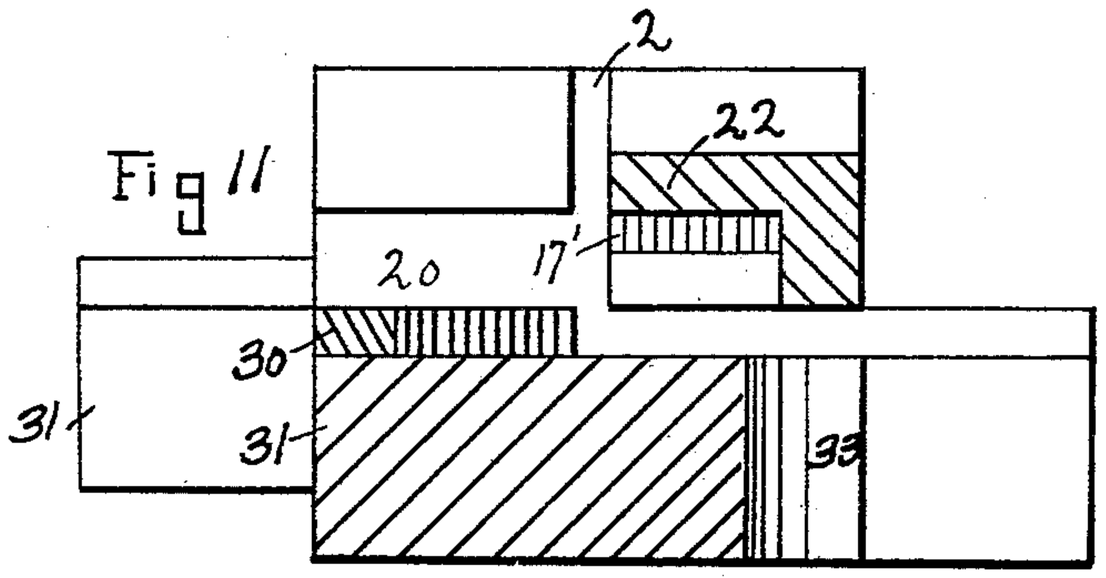
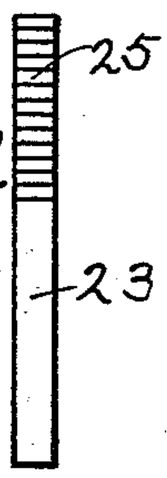


Fig 12



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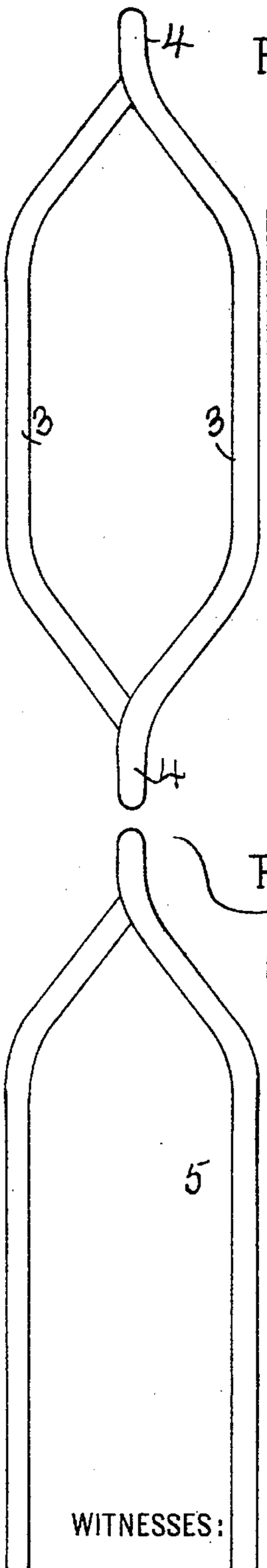

Fig 14

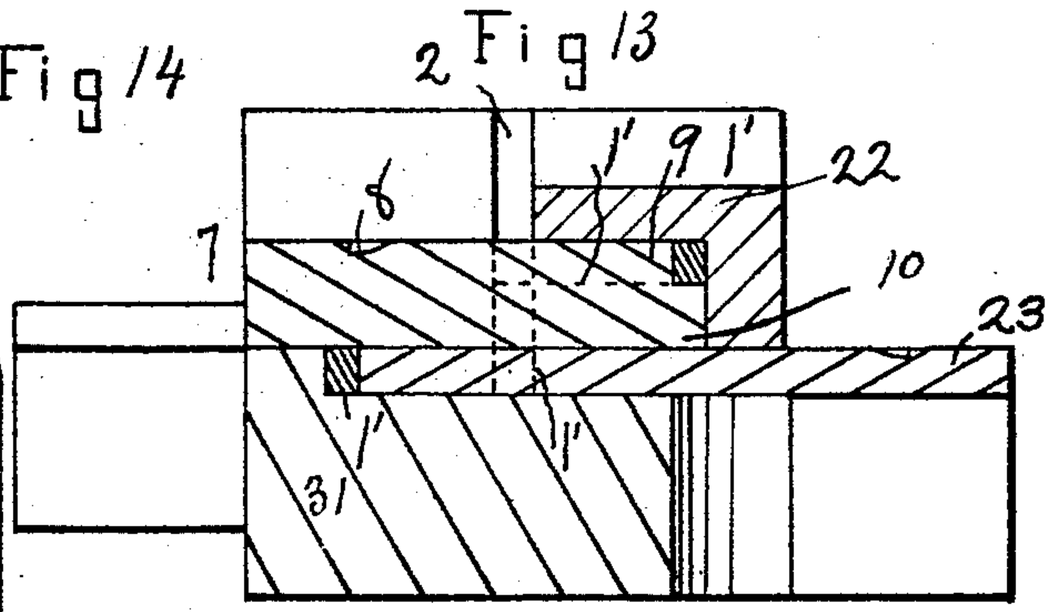

Fig 16

Fig 13

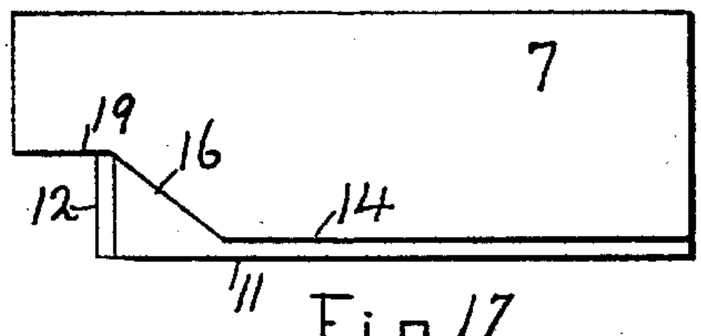

Fig 17

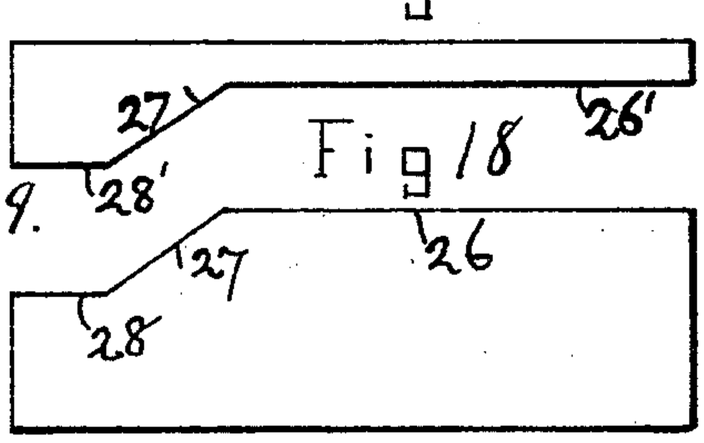

Fig 18

Fig 20

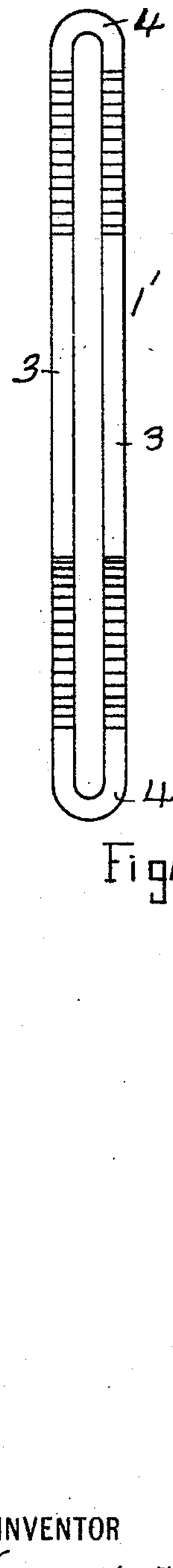

Fig 15

Fig. 19.

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MOLD FOR FORMING ARMATURE-COILS.

SPECIFICATION forming part of Letters Patent No. 616,519, dated December 27, 1898.

Application filed July 27, 1898. Serial No. 687,013. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM K. BASSFORD, Jr., a citizen of the United States of America, and a resident of Bound Brook, county of Somerset, and State of New Jersey, have invented a new and useful Improvement in Electric-Coil Formers, of which the following is a specification.

The object of my invention is to facilitate the manufacture of coils for dynamos and motors. In carrying out the manufacture the electric conductor is wound upon a form, by hand or by a coil-winder, until a predetermined number of convolutions is reached. My invention is of such a nature that the closed coil may be placed in the device as a flat coil and after operating the parts of the device the coil may be taken out in a radically different shape—namely, with its sides bulged outward from their common plane and in the shape of a six-sided figure when projected upon said plane and of a very long oval whose sides are parallel when projected upon a plane perpendicular to the latter. The advantage of the molding device is the uniformity produced in the shape, as well as the quickness and convenience of operation.

The device consists, generically, of a mold having shaping-surfaces therein and a pair of cores adapted to be pushed into the mold toward each other after the mold has received the flat coil. When the cores are removed, the coil is found to be of the proper shape.

The details of construction and operation are set forth by reference to the accompanying drawings.

Figure 1 is a plan of one of the cores shown in full. Fig. 2 is a plan of the complete mold from which the cores are removed. The dots outline certain portions that are invisible. Fig. 3 is a plan of the other core. The two cores are shown located on the sheet upon opposite sides of the mold and are in the proper position for insertion. Fig. 4 is a side view of the flat coil as it appears after winding, but before molding. Fig. 5 is a central cross-section of the core shown in Fig. 1. Fig. 6 is an end elevation of the same core. Fig. 7 is a side elevation of the same core. Fig. 8 is an end elevation of the mold shown in Fig. 2. Fig. 9 is a side elevation of said mold. Fig. 10 is the other side elevation of the mold. Fig. 11 is a vertical cross-section of the mold at the line x in Fig. 2. Fig. 12 is an end elevation of the core shown in Fig. 3. Fig. 13 is a view similar to that shown in Fig. 11, except that the cores are shown in Fig. 13, whereas they are omitted in Fig. 11. The section is at the same line x in Fig. 2 and the view is taken in the same direction. Fig. 14 is one view of a molded coil. Fig. 15 is a view of the same coil, taken at a right angle from the view of Fig. 14. Fig. 16 is a plan of a modified core. Fig. 17 is a plan of a modified part of the mold. Fig. 18 is the other core modified. Fig. 19 is a view of a molded coil formed by the modified cores and mold. Fig. 20 illustrates how the handling of the cores and mold may be facilitated. It is a vertical view, partly in section, and only enough of the mold is shown to identify it.

In the drawings, 1 is the closed coil of wire as prepared by hand or by a winder and ready to be molded in the apparatus forming the subject-matter of this application. It is a flat coil having parallel sides with rounded ends and both sides located in a common plane.

In Fig. 2 the coil is shown located in the slot 2, standing on its edge, while in Fig. 4 the coil is represented in plan or as resting on its two sides. 1′ is the same coil after it is bent into a peculiar shape by the action of the mold and cores. The coil in such a shape is found in Fig. 14 by itself, in Fig. 13 located in the mold, together with the cores, and in Fig. 15 also by itself. Said coil 1′ consists of two sides 3, lying in two parallel planes and curved downward toward each other and turned circularly at the ends 4. The projection of the coil upon a plane in one direction is approximately a six-sided figure whose directly opposite sides are parallel. (See Fig. 14.) Projected upon another plane at right angles to the first the figure is that of two sides parallel to each other and semicircular curves joining the ends of the said sides. (See Fig. 15.)

5 shows a modified molded coil in which one closed curved end is omitted, the sides terminating before beginning to curve. The mold and cores when modified are adapted to form such a modified coil.

One of the two cores for the mold is 6, and

consists of a block 7, provided with a thumb-hole 8 and having a projection 9 upon a second projection 10. The projection 10 is plane at the farthest edge 11 and rounded at the ends 12. The projection 10 is shorter than the block 7, whereby notches are formed by the ends of the projection 10 and the block 7 at 13 of a right-angular shape. The projection 9 has three sides 14, being parallel to the rear edge 15 of the block 7 and the two edges 16 and 17, which start from the rounded ends 12 and slant toward each other until they intersect the edge 14. The distance between the edges 11 of the projection 10 and the edge 14 of the projection 9 is about equal to the thickness of either side of the coil 1. The edges 16 and 17 intersect at their other ends the edges 18 and 19 of the block 7. The edges 18, 17, 14, 16, and 19 are those against which the one side of the coil 1 presses when the coil is compressed by the core 6 in the mold, and the coil then turns around the rounded ends 12 of the projection 10.

In the mold there are edges corresponding to the molding edges 18, 17, 14, 16, and 19 of the core 6, and they are numbered 18′, 17′, 14′, 16′, and 19′. As seen in Fig. 10, the mold has an opening 20 for receiving the projection 10, and the roof 22, forming the top of this opening, is cut out to form the molding-surfaces 16′, 14′, and 17′. When the core 6 is therefore pressed through the opening 20 after the coil has been inserted as in Fig. 2, the side of the coil is bent so that it lies between the said molding-surfaces on the core and the corresponding molding-surfaces on the mold and inside thereof.

I will now proceed to offer similar explanations in regard to the other core and the molding-surfaces on both the core and the mold. The second core is numbered 23, and it has five molding or forming edges 24, 25, 26, 27, and 28, arranged as follows: The rear or pushing edge of the core 23 is 29. Directly opposite and parallel thereto is one of the molding edges 26, extending until intersecting the two equally-slanting edges 25 and 27, which point toward each other and begin at the edges, respectively, 24 and 28, which are also parallel to the rear edge 29. The hole 8′ is to assist the thumb in pulling the core out of the mold. A part of the mold is so cut as to leave corresponding molding-surfaces 24′, 25′, 26′, 27′, and 28′. In Fig. 2 these last-named surfaces are shown as belonging to the block 30, which is removable from the mold, while in the modification in Fig. 13 these surfaces are cut directly upon the body 31 of the mold. The shoulders 32 on the block or mold 31 prevent the molding-piece 30 from being forced away or out of position during operation. 33 is where a portion is cut away to leave room for the fingers in pulling the core 23 out of the mold 31.

In order that the cores may both be pushed into the mold, there are guides 34 and 35 and resting-surfaces 37 and 38 for the core 6 and guides 39 and 40 for the core 23 and also resting-surfaces 41 and 42 for the core 23. These guides and resting-surfaces are all on the mold 31. When the core 23 is forced into the mold, it not only rests upon the surfaces 41 and 42, but slides over the top of the top or upper surface of the mold 31 and at the same time under the core 6, while the core 6 is directly on top of the core 23 and under the roof 22 of the mold 31. They are entered from opposite sides of the mold and are forced toward each other after the coil 1 has been placed into the slot 2. They may be driven in with a mallet or by a strong man by his hands and may then be pulled out with the hands. The result is not only obtained quickly, but the shape is true.

In Fig. 20 is illustrated enough to show that the hands may be assisted by external means as a matter of convenience. The core 23 is shown as fixed upright by screws 44, while the core 6 is adapted to slide up and down on guiding-rods 43, while the mold 31 may be held or supported between the two. When all are in position and the coil inserted, the whole may be driven together by a heavy mallet.

By a simple modification in the construction the cores and mold may be adapted to form coils that are not closed upon themselves. Coils like that in Fig. 19 may be formed. To this end the two cores and the piece 30 are like they are in Figs. 1 to 15, except that the surfaces 14, 11, 26′, and 26 are carried out straight to the ends of the said pieces, so that only one end of the coil will be bent at all.

I claim as my invention—

1. The combination of a mold having a vertical central slot for receiving a flat coil of wire, whose sides lie in the same plane, and having vertical molding-surfaces located horizontally opposite the respective sides of the coil in different parallel planes, and cores with similar surfaces, adapted to enter on opposite sides of the mold and to press the sides of the coil against the first-named surfaces.

2. The combination of a mold consisting of a block having a slot extending partly through the block, and having a slot at right angles thereto extending partly into the block and terminated by a surface whose shape corresponds to that which the molded coil is to have, said block having also a slot parallel to the second and terminated by a similar molding-surface, and cores having similar molding-surfaces located in the last-named slots, one of the cores having a projection extending across the first-named slot for limiting and forming the ends of the coil to be molded, the molding-surfaces of the two cores being separated in the mold to a distance equal to the thickness of said coil, the said block being provided with guiding and sliding surfaces for the core.

3. A device for shaping coils, consisting of a block having a slot, for receiving the coil within the block, and having lateral open-

ings extending to opposite sides of the said slot, and cores movable to and fro relatively to the slot, and overlapping each other to a predetermined distance beyond the slot.

4. A mold in combination with cores, movable inward from opposite sides of the mold, and having a passage-way within the same, between the molding-surfaces of the mold and cores, extending in the line of a closed figure, whose opposite sides are in different parallel planes.

Signed this 19th day of July, 1898.

WILLIAM K. BASSFORD, JR. [L. S.]

Witnesses:

ARTHUR H. MENO,

RALPH K. MINER.