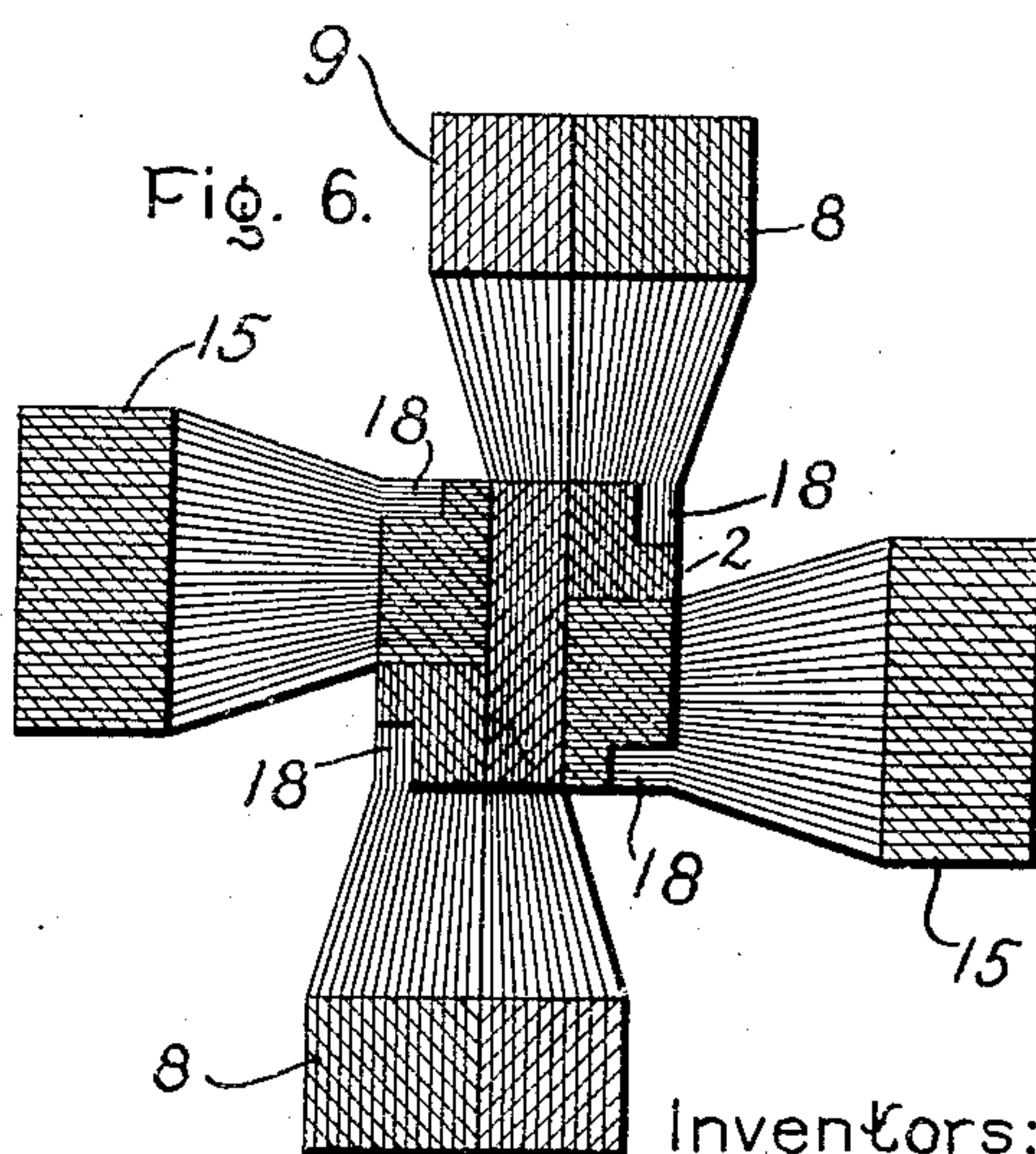
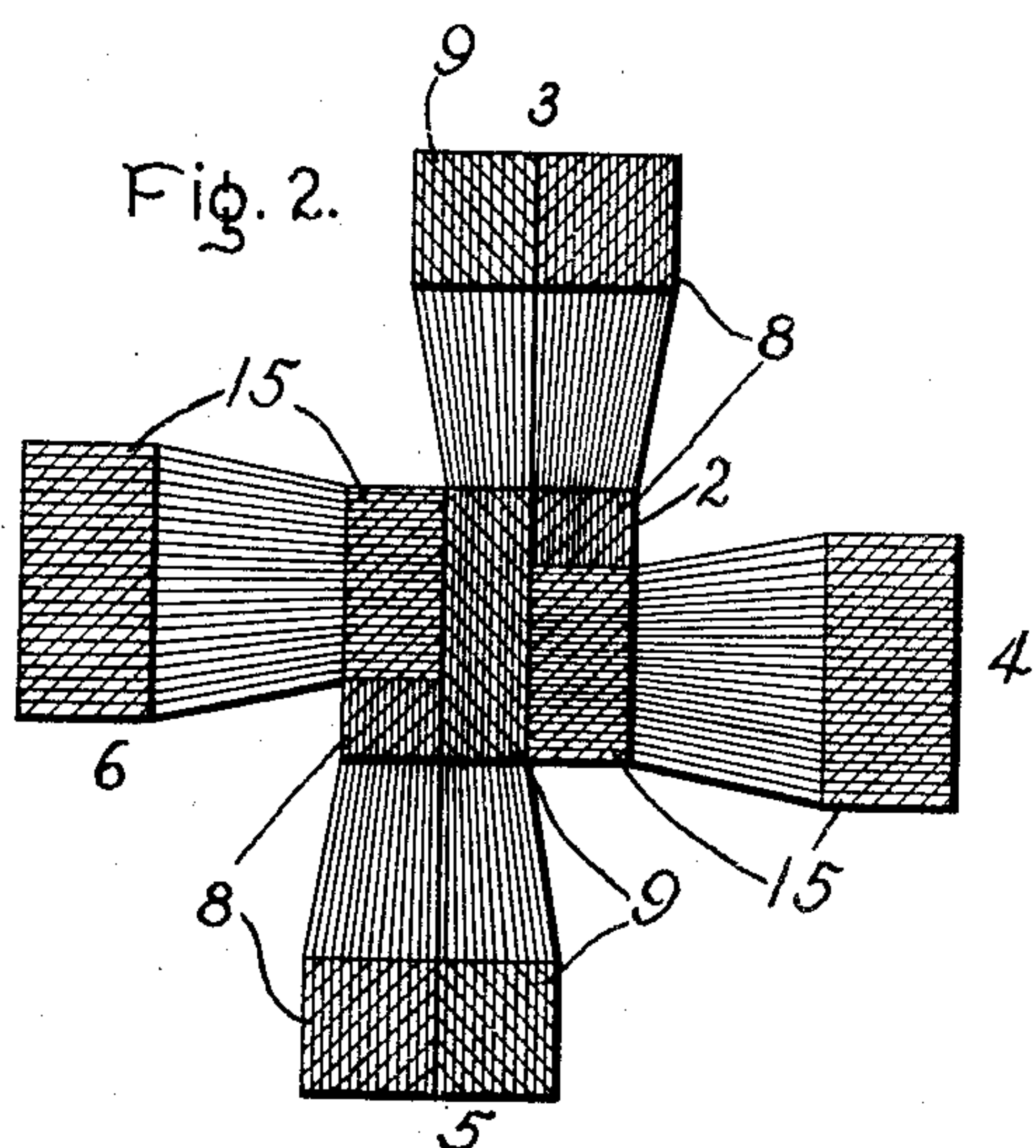
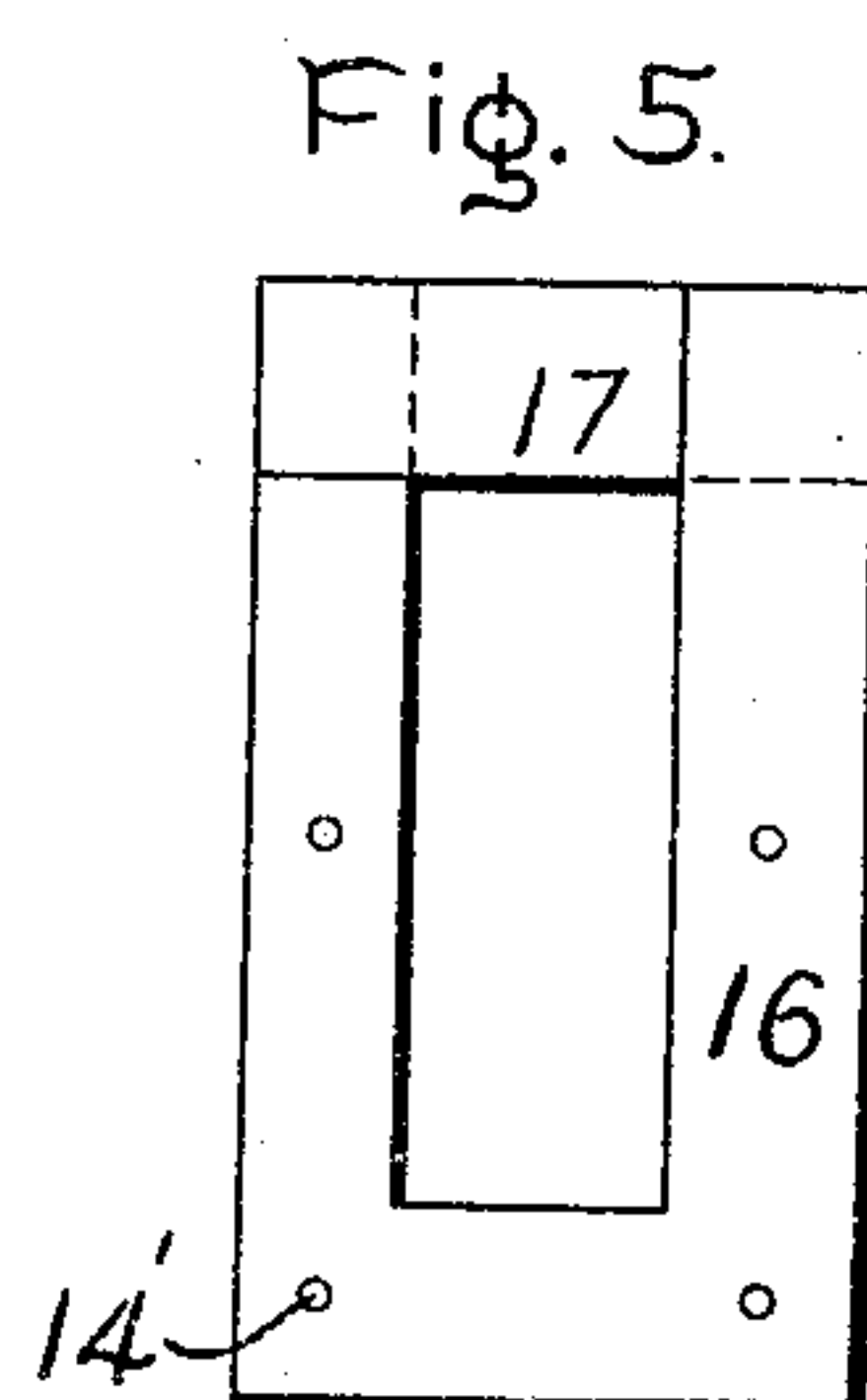
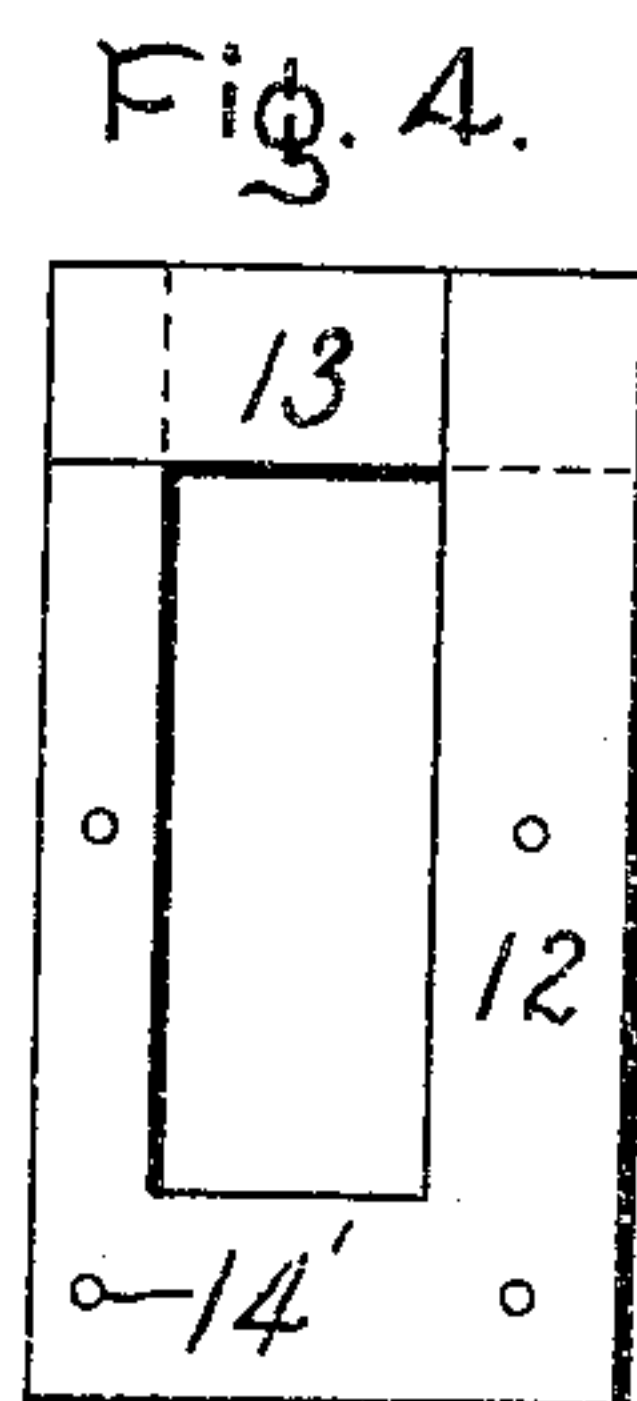
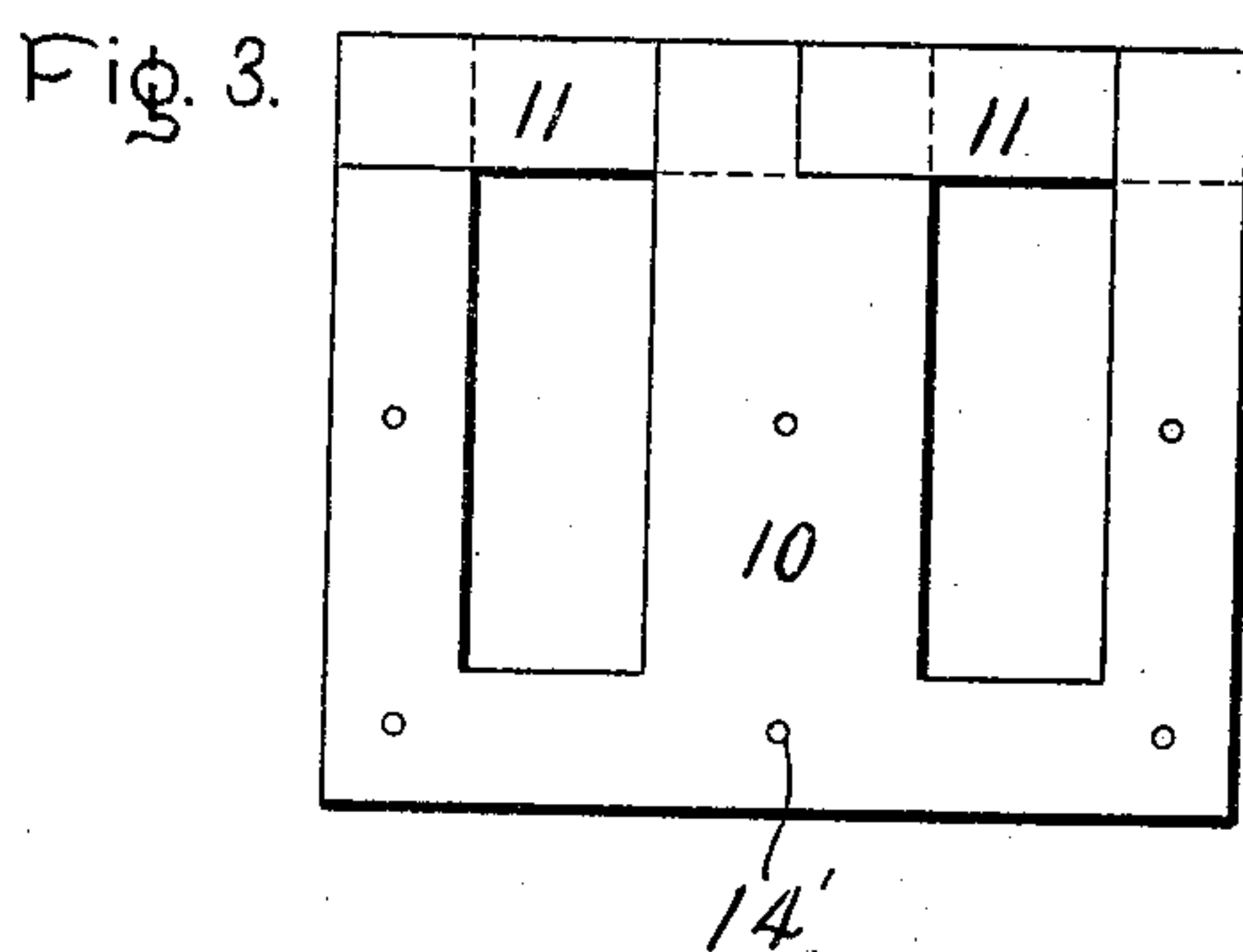
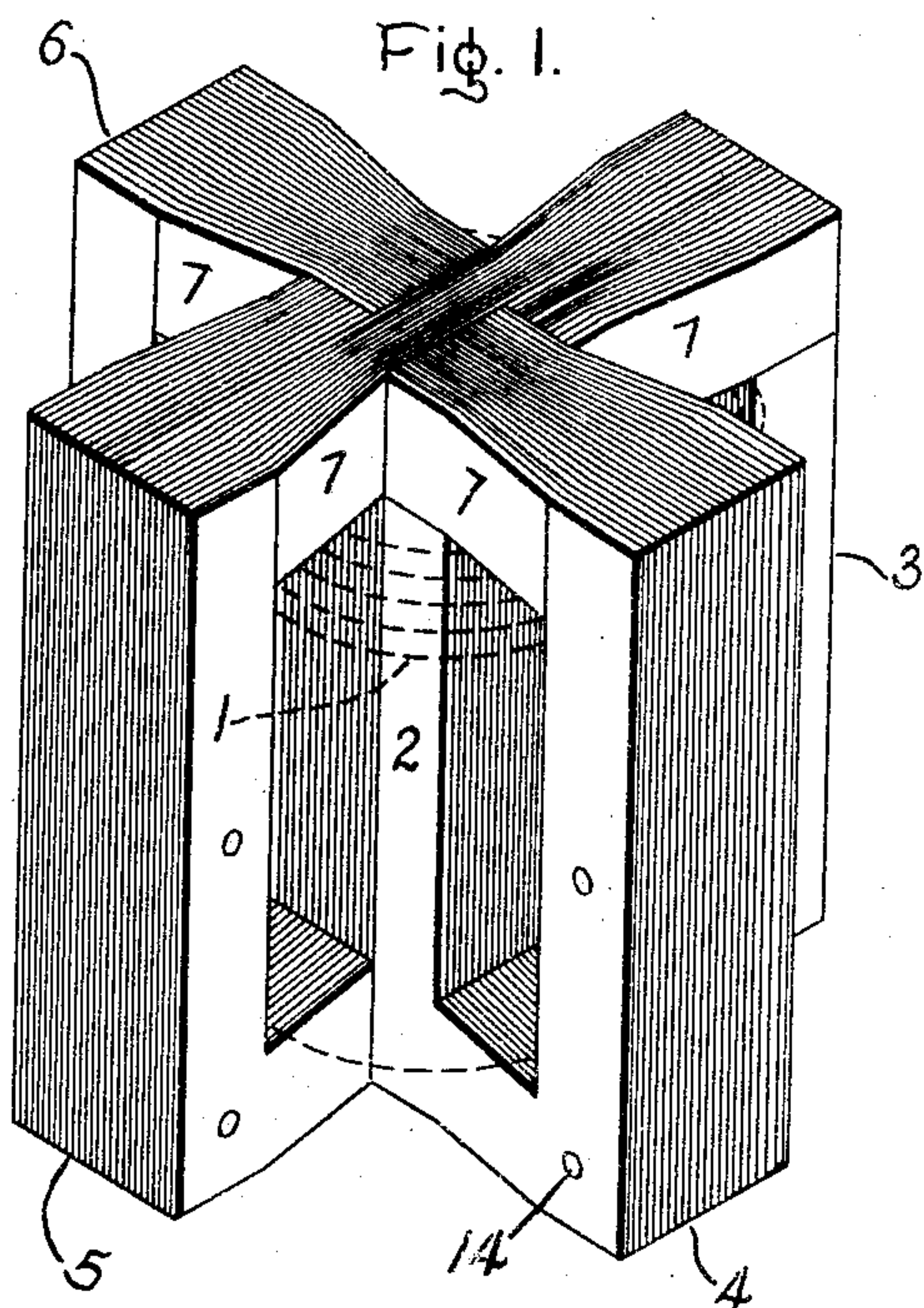


No. 850,714.

PATENTED APR. 16, 1907.

C. E. ALLEN & S. R. BERGMAN.
TRANSFORMER.

APPLICATION FILED APR. 24, 1906.



Witnesses:
Burchard V. Kelley
Helen O. Ford

Inventors:
Claxton E. Allen
Sven R. Bergman.
by *Albert G. Davis*
Att'y.

UNITED STATES PATENT OFFICE.

CLAXTON E. ALLEN AND SVEN R. BERGMAN, OF LYNN, MASSACHUSETTS,
ASSIGNORS TO GENERAL ELECTRIC COMPANY, A CORPORATION OF
NEW YORK.

TRANSFORMER.

No. 850,714.

Specification of Letters Patent.

Patented April 16, 1907.

Application filed April 24, 1906. Serial No. 313,375.

To all whom it may concern:

Be it known that we, CLAXTON E. ALLEN, a citizen of the United States, and SVEN R. BERGMAN, a subject of the King of Sweden, residing at Lynn, in the county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Transformers, of which the following is a specification.

Our present invention has for its object the production of a transformer possessing excellent mechanical and operating properties and which may be readily and economically constructed.

The various features of novelty which characterize our invention are pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of our invention and the advantages possessed by it reference may be had to the accompanying drawings and descriptive matter, in which we have illustrated forms in which it may be embodied.

Of the drawings, Figure 1 is a perspective view of a transformer-core with the windings therefor shown in dotted lines. Fig. 2 is a cross-sectional plan view of the core, taken between the end portions of the core. Figs. 3, 4, and 5 are elevations of different punchings which may be employed; and Fig. 6 is a view similar to Fig. 2, showing a modified construction.

In our improved transformer-core the windings shown in dotted outline in Fig. 1, which may be in the form of concentric cylindrical coils, surround a central leg 2 of the core and are inclosed by four outer core-legs 3, 4, 5, and 6, which are parallel to each other and to the central leg 2. The ends of the central leg are connected to the ends of the other legs by suitable end connections 7.

In forming our core we employ a main unit and two auxiliary units. The main unit of the core includes the outer legs 3 and 5 and a portion of the central leg 2 and is composed of two similar bundles of laminæ 8 and a bundle of laminæ 9 interposed between them. The central bundle of laminæ 9 is substantially rectangular in outline and has formed in it two coil-receiving windows which are separated from each other by a central portion which forms a part of the leg 2 of the core. The bundle 9 may advantageously be

formed of E-shaped punchings 10 and suitable end punchings 11, as shown in Fig. 3. In assembling the punchings it will be understood that some of the punchings composing the central bundle 9 are reverse with respect to the others, as indicated by the dotted lines in Fig. 3, so that the laminæ break joints. Each bundle 8 is substantially rectangular in outline and is formed with one coil-receiving window. The bundles 8 and 9 are assembled so that the window in one bundle 8 registers with one of the windows in the bundle 9 and the window in the other bundle 8 registers with the other window in the bundle 9. The bundle 8 may advantageously be composed of U-shaped punchings 12 and rectangular end closing members 13, as shown in Fig. 4. In order that the joints may be broken in the bundles 8, the two legs of the U-shaped punchings are of different lengths. In some of the punchings the narrower leg is the shorter, as shown in full lines in Fig. 4, while in other punchings the narrower leg is the longer, as indicated by the dotted lines in Fig. 4. The laminæ composing the bundles 8 and 9 may be secured together in any suitable manner, as by rivets or pins 14 of insulating material—such as wood, hard fiber, or the like—passing through registering holes 14', formed for the purpose in the punchings.

The portions of the bundles 8 forming a part of the central leg 2 of the core are considerably narrower than the corresponding portion of the bundle 9. Against each side of the central portion of the bundle 9, projecting by the corresponding portion of the adjacent bundle 8, is placed one of the auxiliary units of the core. As shown, each of the auxiliary units, which are identical in construction, is in general similar to the bundles 8, being composed of a rectangular bundle 15 of laminæ, extending transversely to the laminæ in the bundles 8 and 9 and having a rectangular coil-receiving window formed in it. In the construction shown in Fig. 2 the thickness of the portion of each bundle 15 forming a part of the central leg 2 of the core plus the width of the portion of the corresponding bundle 8, forming a part of the central leg, is equal to the width of the central portion of the bundle 9. As a result the central leg is rectangular in cross-section. The laminæ 16 and 17, composing each bundle 15 and corre-

sponding to the laminæ 12 and 13, respectively, may be secured together by suitable rivets of insulating material, and the main and auxiliary units may also be secured together in any suitable manner.

In the form of our invention shown in Fig. 6 a notch 18, rectangular in cross-section, is formed in each corner of the central leg of the core by making the window in a portion of the laminæ forming the side bundles 8 and the auxiliary bundles 15 wider than the window in the body of the corresponding bundles. With this arrangement the mean length of conductor surrounding a central leg of given cross-section may be made smaller than when the central leg is shaped as shown in Fig. 2. In all of the forms of our invention the outer legs of the core may be made wider than the corresponding portions of the central leg by interleaving in the outer legs a certain amount of rectangular laminæ of magnetic material.

The embodiments of our inventions hereinbefore described when properly proportioned and arranged form highly efficient transformers in which copper, a relatively high-priced material, and iron, a relatively low-priced material, are economically employed. The different punchings employed are few in number and may be readily produced, and the method of assemblage is such that the transformer-cores produced possess excellent mechanical properties and can be readily handled and transported.

What we claim as new, and desire to secure by Letters Patent of the United States, is—

1. In combination, a winding, and a core portion surrounded thereby comprising a central layer of relatively wide laminæ, two layers of relatively narrow laminæ parallel to

and placed one at each side of said central layer, and at opposite edges thereof, and two other layers of laminæ transverse to those of the central layer placed one at each side of the central layer, the thickness of each of said other layers being equal to the difference in width between one of said relatively wide laminæ and one of said relatively narrow laminæ.

2. In a transformer, a core consisting of a main unit and two auxiliary units, said auxiliary units being laminated transversely to the main unit, said main unit consisting of a central bundle of laminæ having two transverse coil-receiving windows separated by a central portion and two side bundles of laminæ one at each side of said central bundle and each having one coil-receiving window formed in it, the window in one of said side bundles registering with one window in the central bundle and the window in the other side bundle registering with the second window in the central bundle, said central portion being wider than the corresponding portion of the side bundles, the auxiliary units being composed each of a bundle of laminæ having one coil-receiving window formed in it, said auxiliary units being arranged at opposite sides of said main unit with the edges of the laminæ of each auxiliary unit abutting against the portion of said central portion projecting by the corresponding side bundle.

In witness whereof we have hereunto set our hands this 21st day of April, 1906

CLAXTON E. ALLEN.
SVEN R. BERGMAN.

Witnesses:

JOHN A. McMANUS, Jr.,
HENRY O. WESTENDARP.