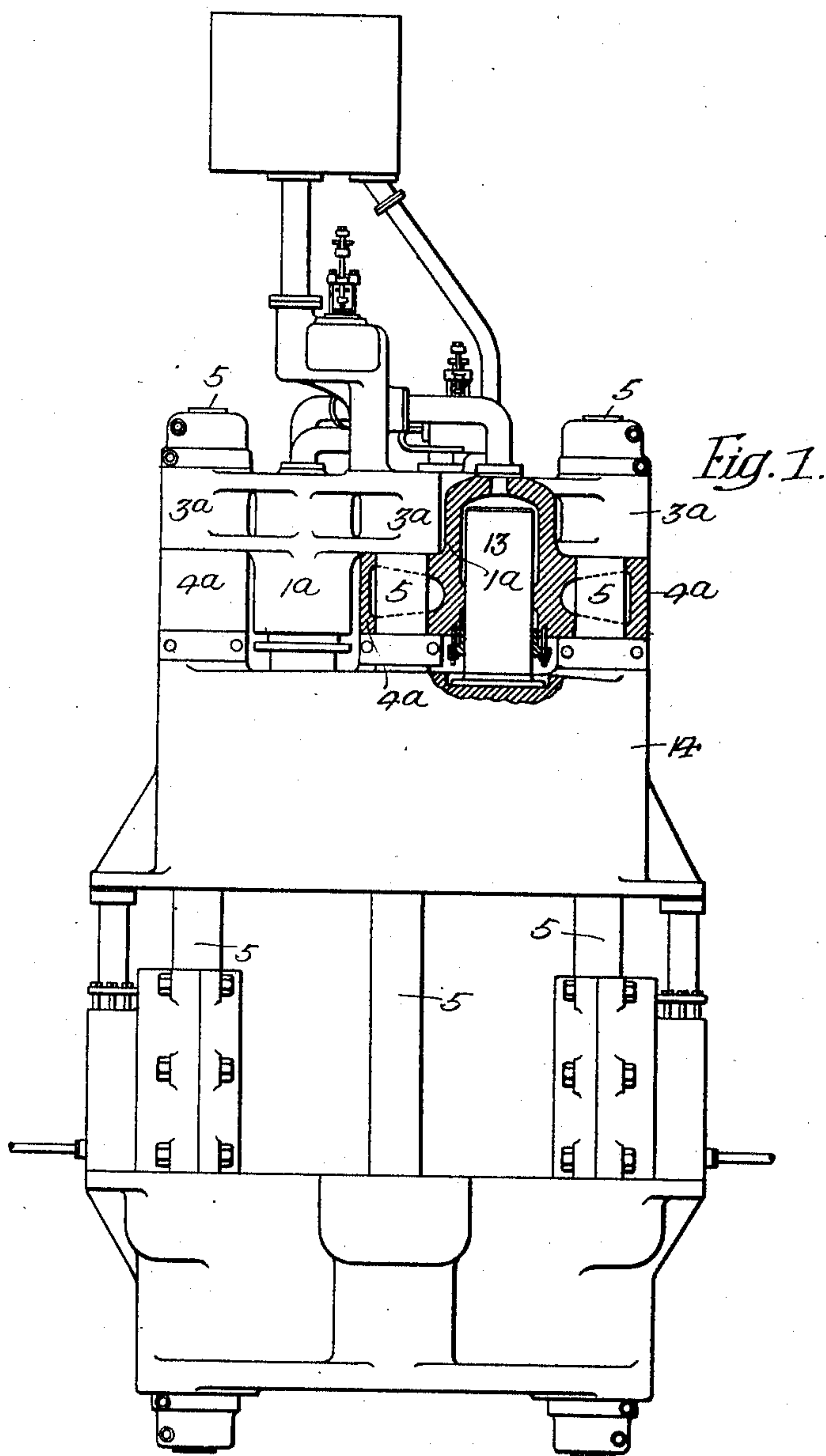


A. A. LONGAKER.
CYLINDER SYSTEM FOR HYDRAULIC PRESSES.
APPLICATION FILED MAR. 18, 1911.

996,992.

Patented July 4, 1911.

4 SHEETS—SHEET 1.



Witnesses—
Walter Chism
Walter Burrows

Inventor—
Albert A. Longaker
by his Attorneys—
Hewson & Hewson

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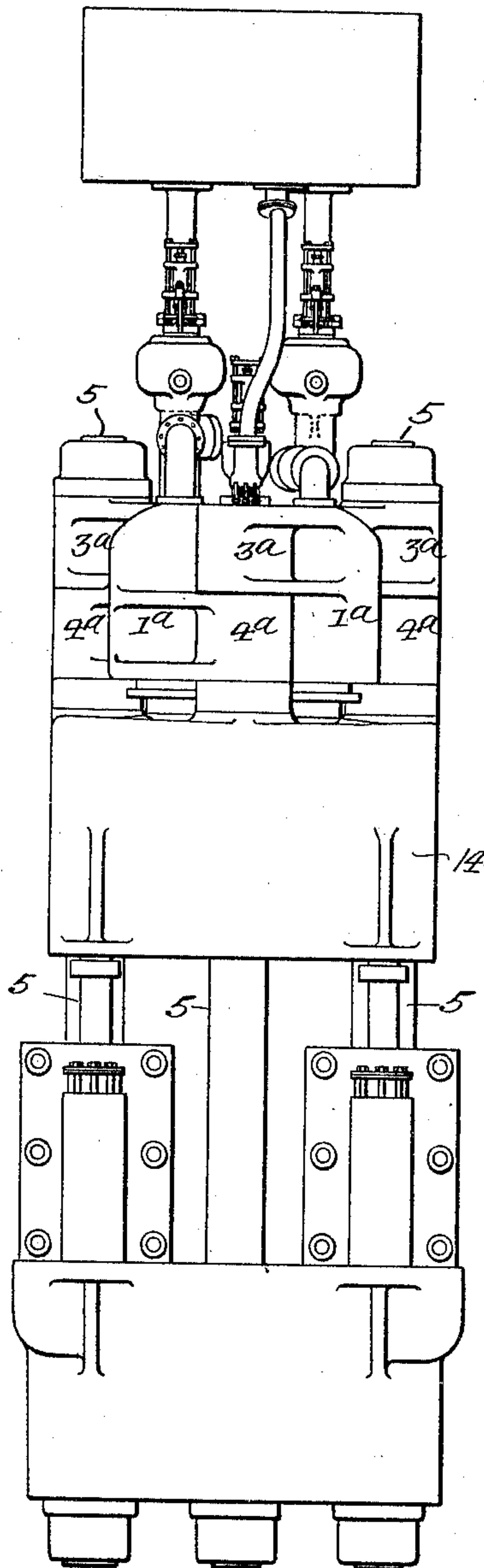


Fig. 2.

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4 SHEETS—SHEET 3.

Fig. 3.

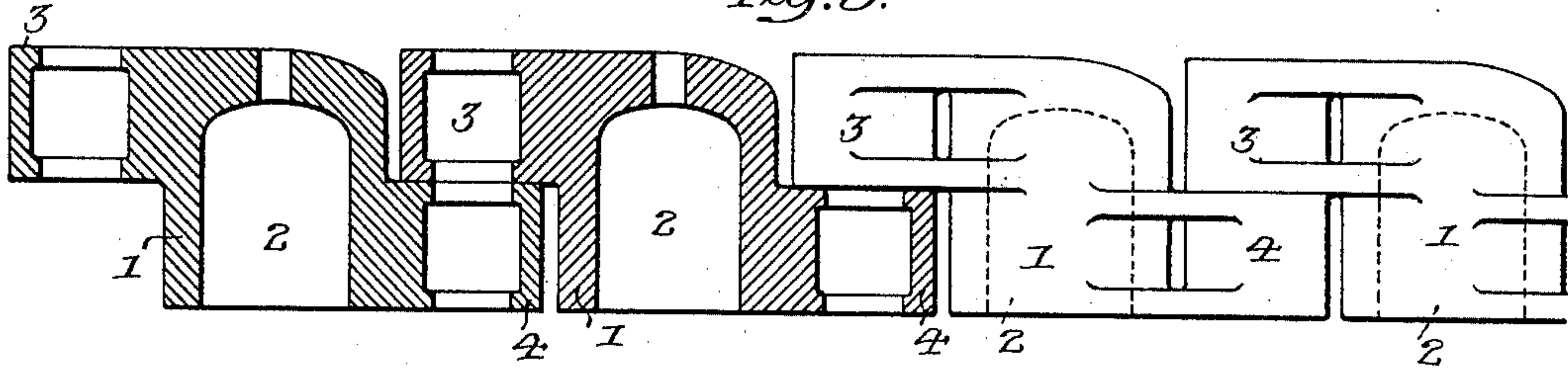


Fig. 5.

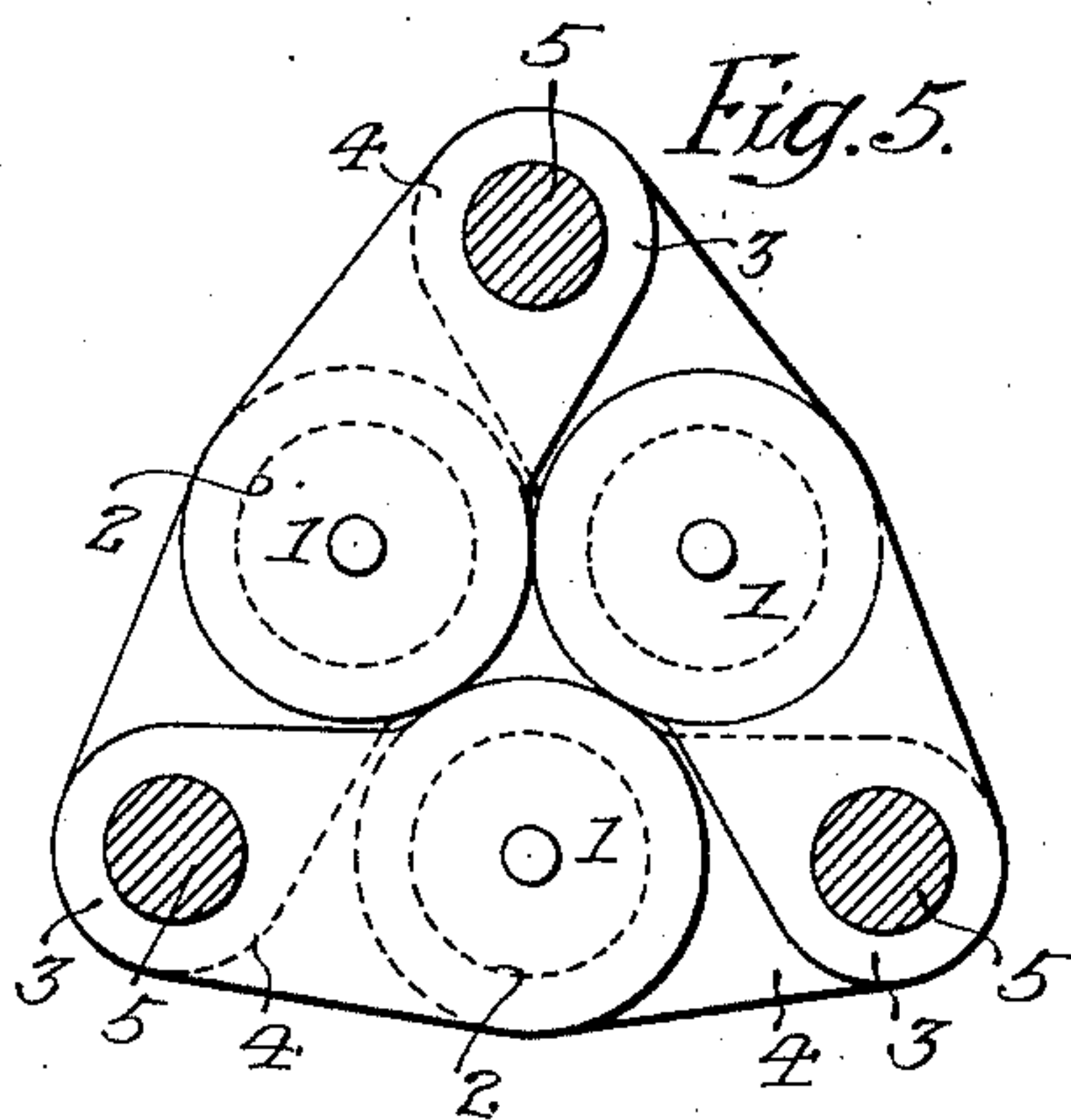


Fig. 7.

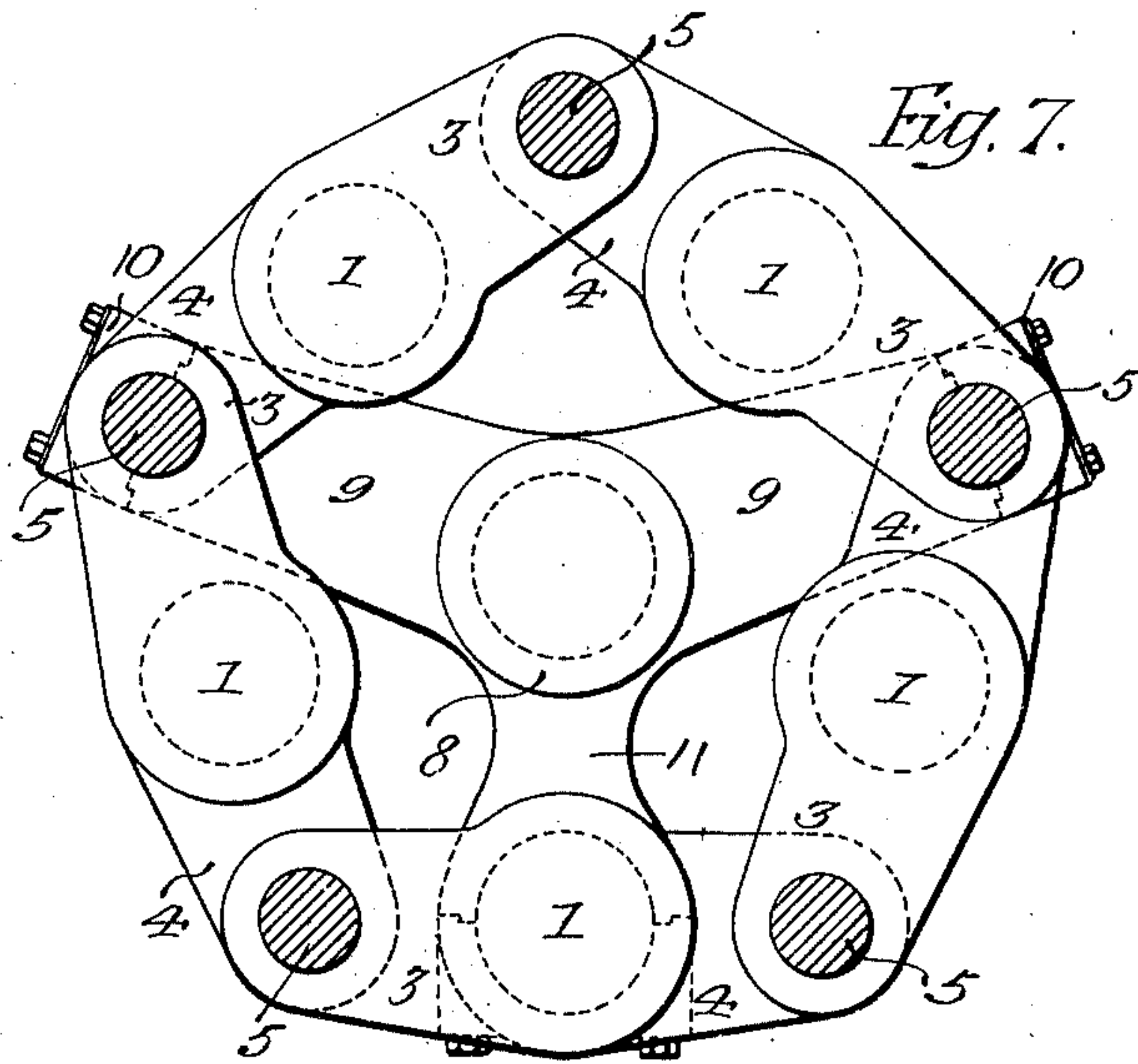


Fig. 6.

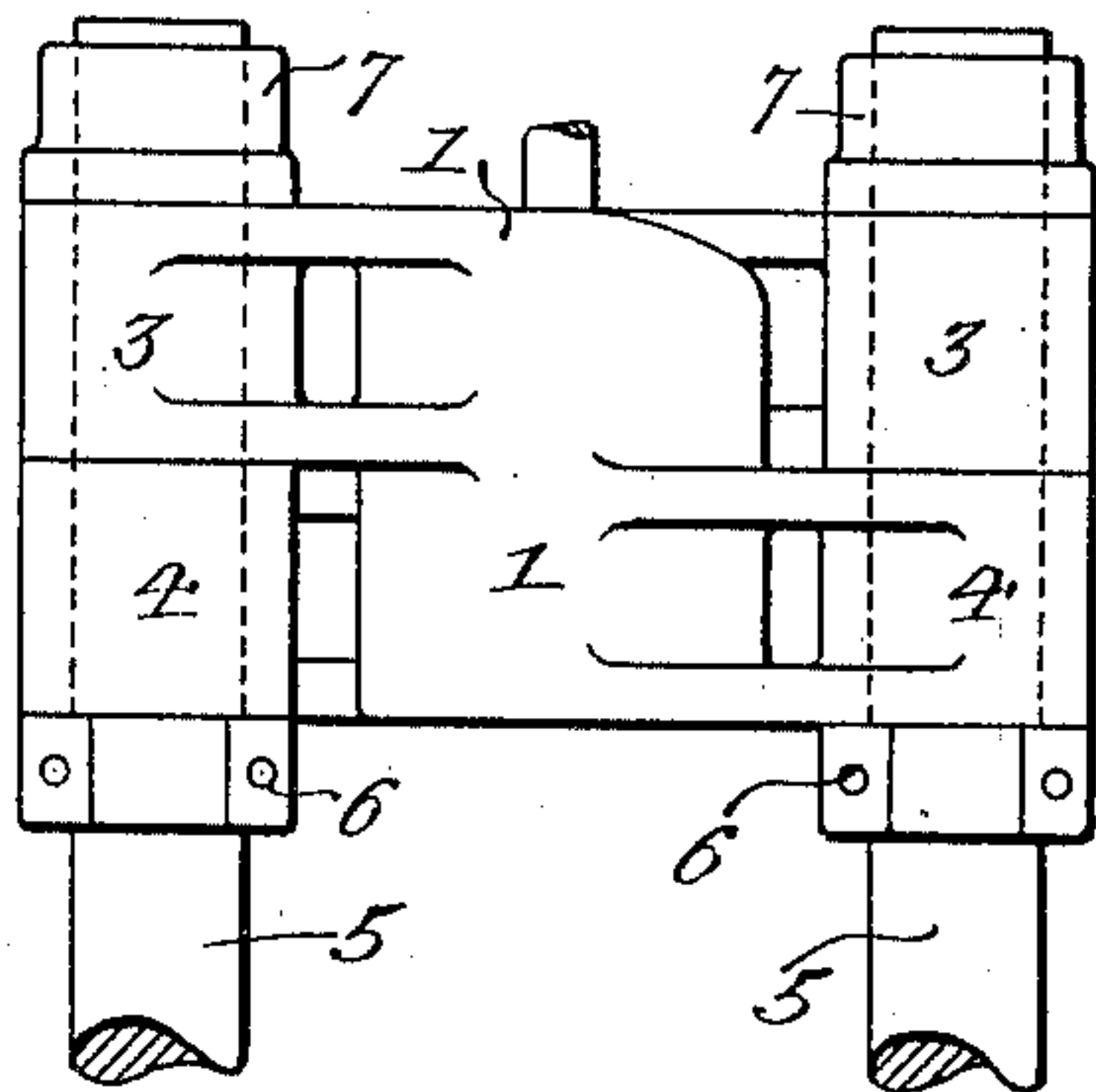
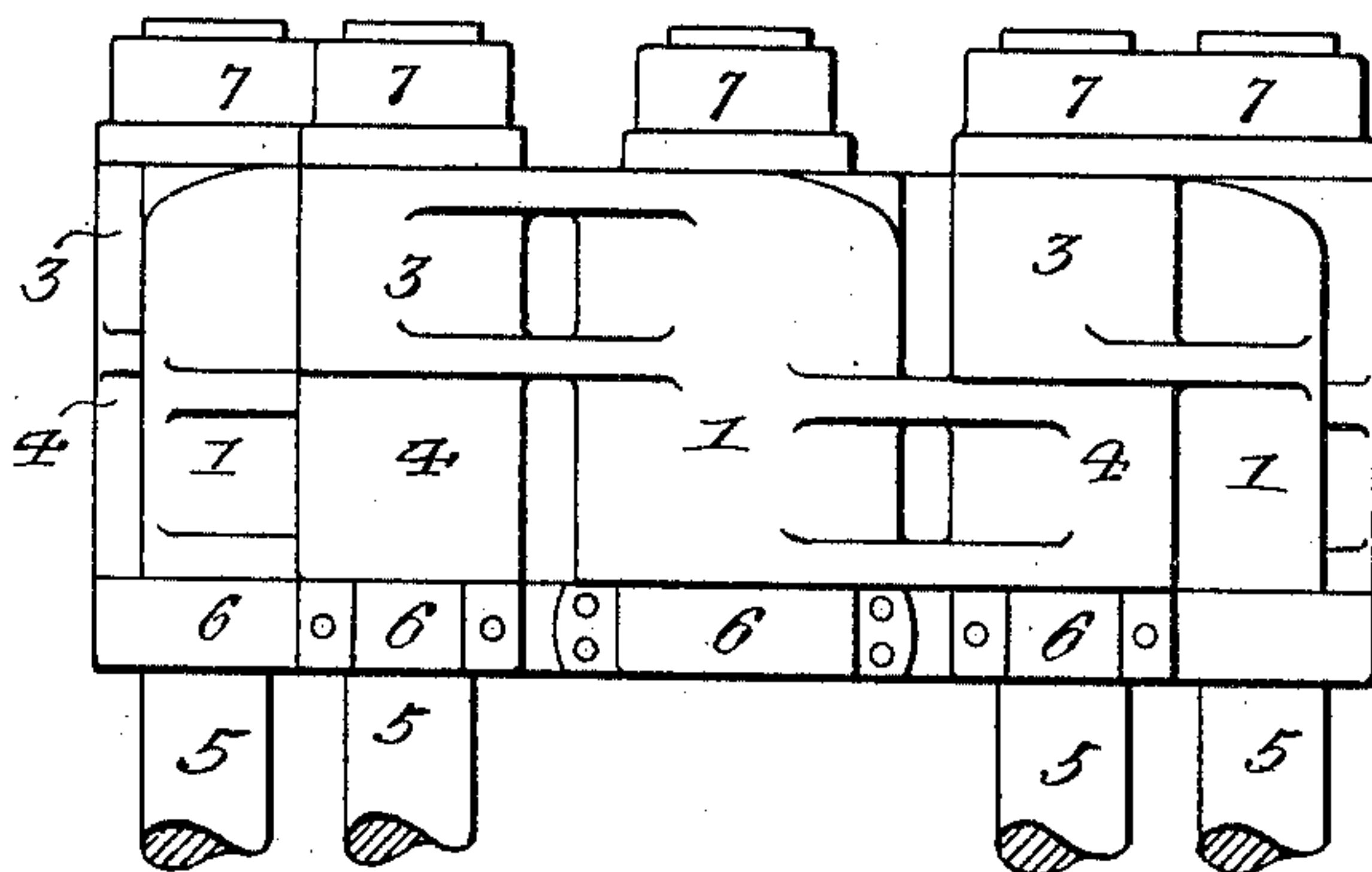


Fig. 8.



Witnesses—
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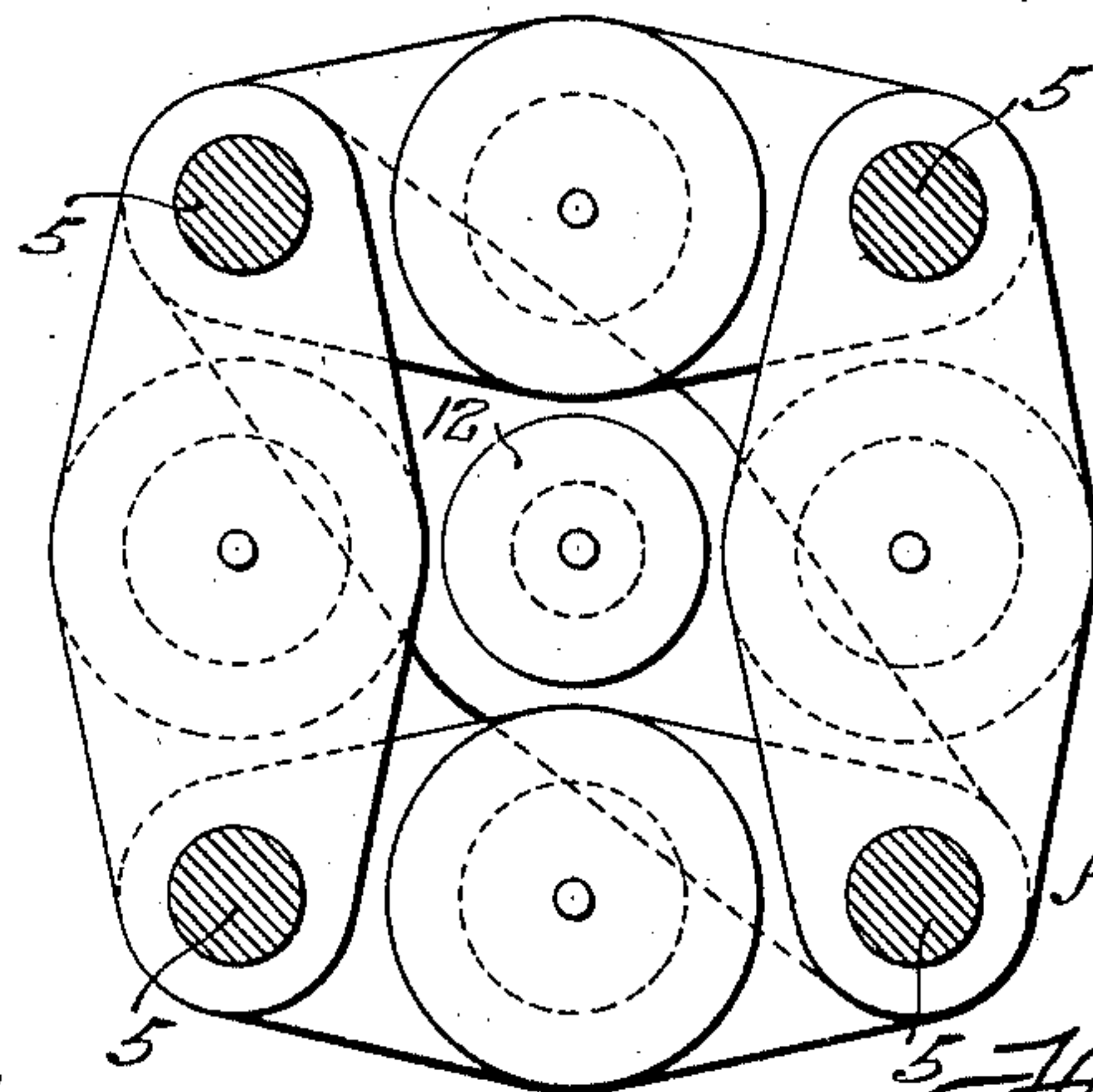
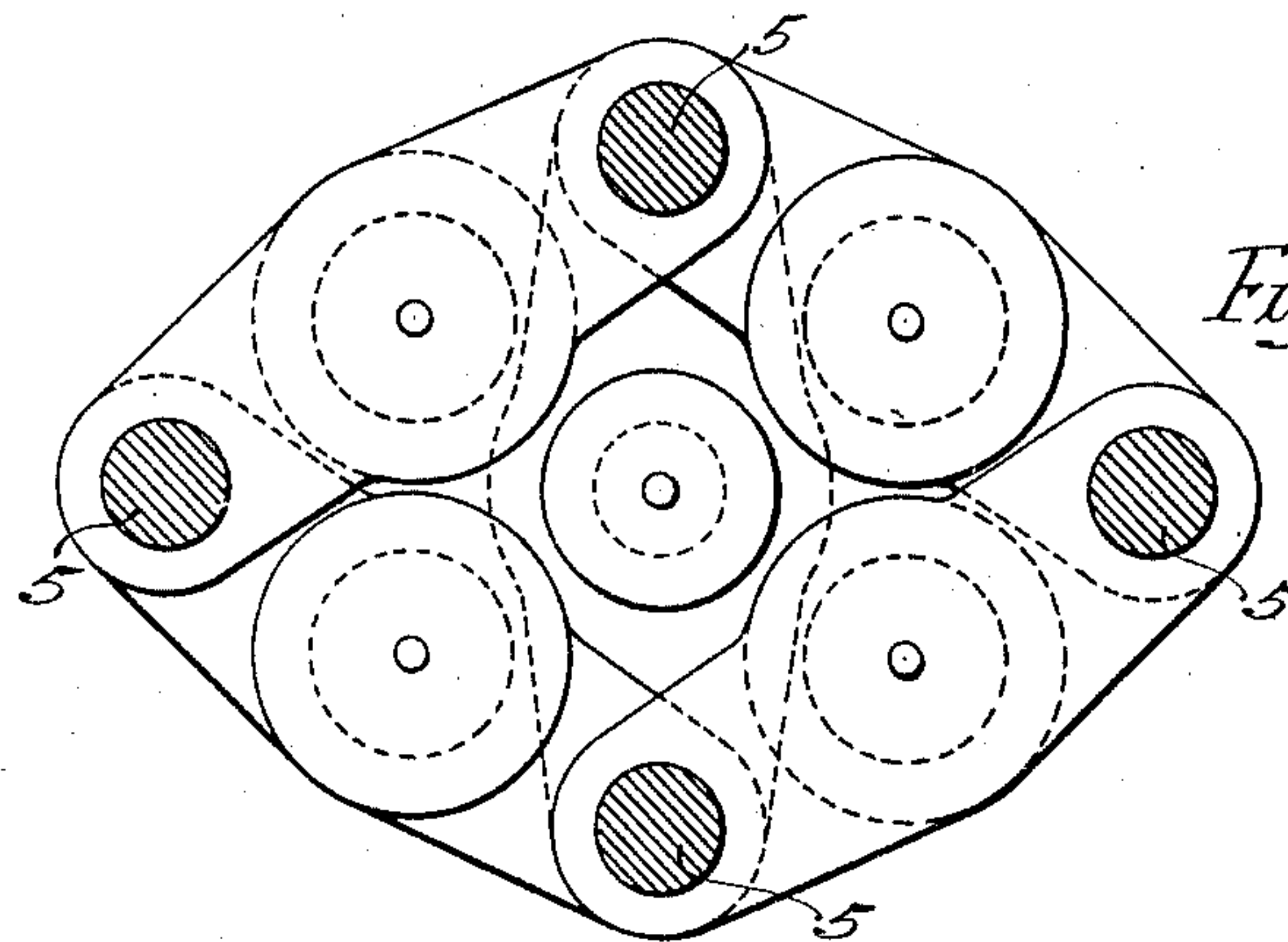
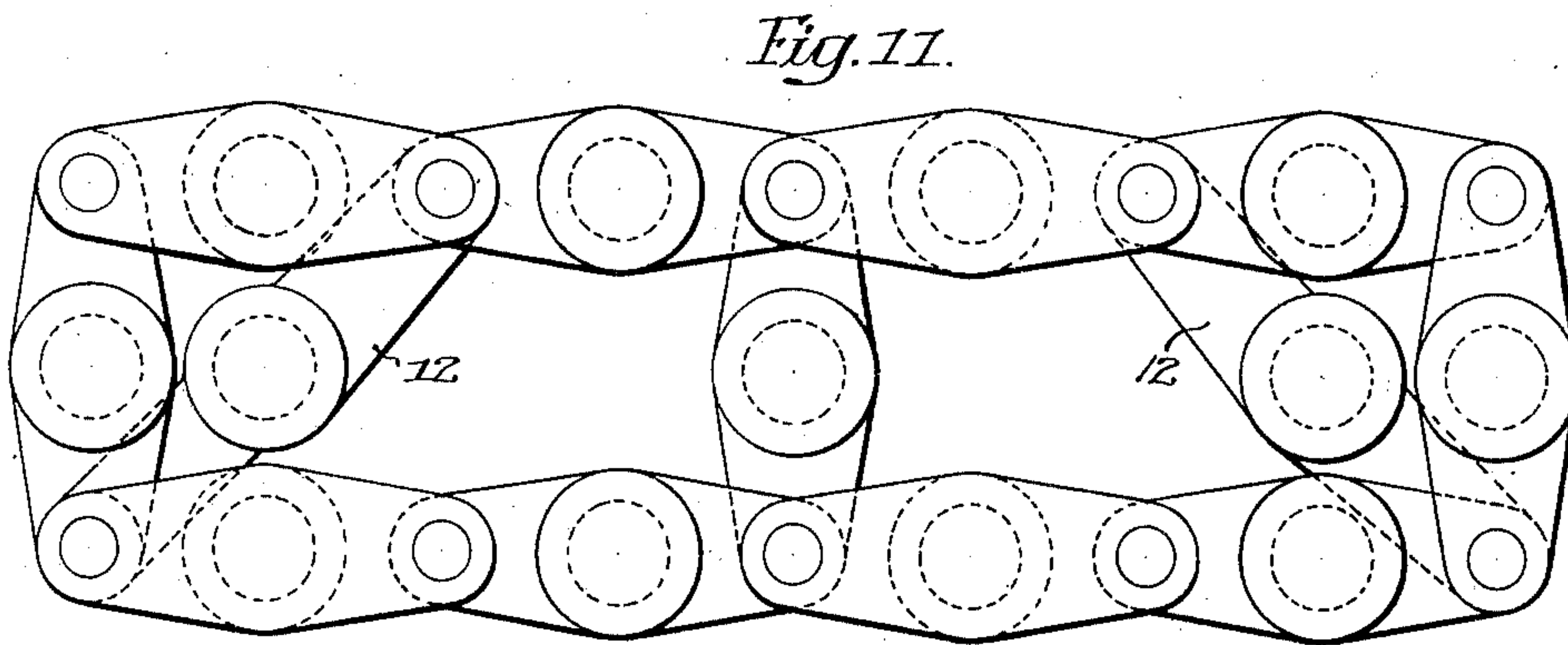
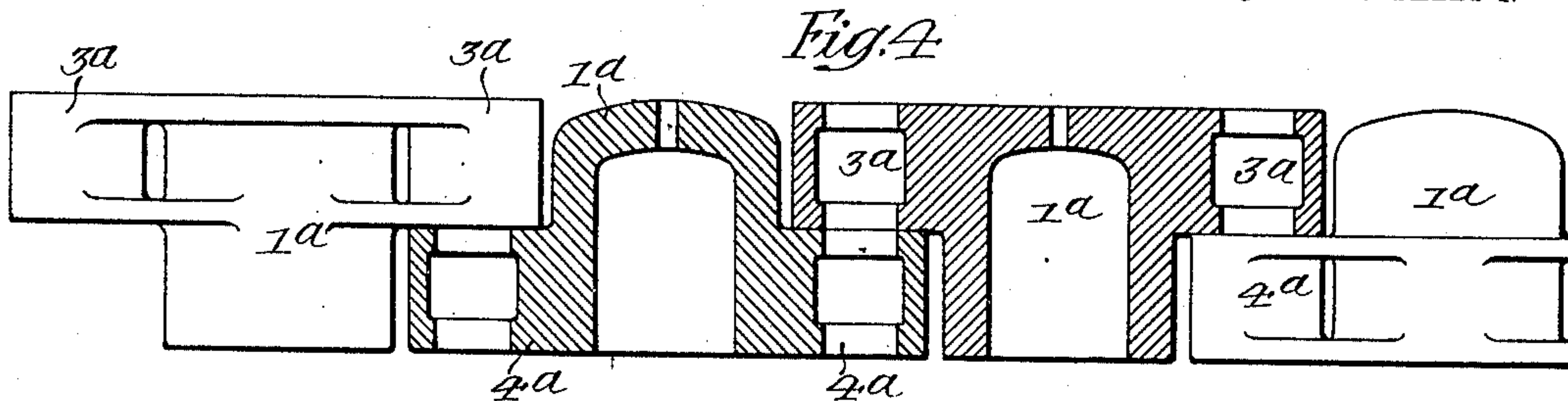
Inventor—
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by his Attorneys—
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4 SHEETS—SHEET 4.



Witnesses—
Walter Chism
Wills A. Burrows

Inventor—
Albert A. Longaker
by his Attorneys—
Howson & Howson

UNITED STATES PATENT OFFICE.

ALBERT A. LONGAKER, OF CHAMBERSBURG, PENNSYLVANIA, ASSIGNOR TO CHAMBERSBURG ENGINEERING COMPANY, OF CHAMBERSBURG, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

CYLINDER SYSTEM FOR HYDRAULIC PRESSES.

996,992.

Specification of Letters Patent.

Patented July 4, 1911.

Application filed March 18, 1911. Serial No. 615,196.

To all whom it may concern:

Be it known that I, ALBERT A. LONGAKER, a citizen of the United States, and a resident of Chambersburg, Franklin county, Pennsylvania, have invented certain Improvements in Cylinder Systems for Hydraulic Presses, of which the following is a specification.

One object of my invention is to provide a hydraulic press which while being equipped with a number of operating cylinders and therefore capable of being operative at any of a number of different tonnages, shall possess great flexibility, both as to its shape and possible size, and in addition shall have its parts so arranged as to distribute the load between a relatively large number of columns, instead of but a few, as has heretofore been customary.

It is further desired that the arrangement of parts shall be such as to decrease the strain on the individual column and also to distribute the stress more uniformly throughout the base and table castings.

One serious objection to presses having a plurality of operating cylinders arises from the fact that the large castings necessarily employed are difficult and costly to manufacture, since blow-holes, spongy, or otherwise defective portions in one cylinder frequently make it necessary to discard the entire casting. Again, in case a casting is cracked or injured under operating conditions, it is necessary to provide an entirely new casting.

My invention, therefore, is particularly designed to obviate these objections in providing a press in which a plurality of cylinders is employed, each being formed as an independent unit or casting connected or linked to other independent cylinder castings or units of the press.

It is further desired to provide a press consisting of a plurality of independent cylinder units of such construction that they may be easily handled, conveniently made and finished, and easily replaced independently of the other units in the event of one of them becoming injured, or when this is desirable from any cause.

These objects and other advantageous ends I secure as hereinafter set forth, ref-

erence being had to the accompanying drawings, in which;—

Figure 1, is a front elevation partly in section, illustrating a hydraulic press constructed according to my invention; Fig. 2, is a side elevation of the press shown in Fig. 1; Fig. 3, is a side elevation, partly in section, illustrating four cylinder units of a multiple cylinder press removed from their columns and developed; this particular construction of cylinders being especially adapted for use in presses having an odd number of columns; Fig. 4, is a side elevation partly in section, illustrating the development of a number of cylinders particularly adapted for use in a press having an even number of columns; Fig. 5, is a sectional plan of the cylinders of a three cylinder press showing them as mounted upon their columns; Fig. 6, is a side elevation of the combination of cylinders shown in Fig. 5; Fig. 7, is a sectional plan of a press employing five linked cylinders in combination with an additional central cylinder; Fig. 8, is a side elevation of the cylinder structure shown in Fig. 7; Figs. 9 and 10 are sectional plans illustrating two arrangements of the cylinders shown in Fig. 4, showing these as assembled on their columns and in each case provided with a central cylinder, and Fig. 11, is a plan of a press having thirteen linked cylinders particularly designed for use on long pieces of work.

Referring to Fig. 3, 1 represents the barrel of each of a number of similar cylinder castings, each formed with a cylindrical cavity 2 in which a plunger or piston is designed to work in the well-known manner, and each having, in the present instance, two projecting lugs 3 and 4. The first of these lugs projects from the upper portion of one side of the barrel, while the second projects from the lower portion of the opposite side thereof and each lug is accurately bored to fit one of the columns of the press.

If desired, the cylinder castings, instead of being constructed as in the press shown in Fig. 3, of such form that either an odd or an even number of them may be used in the press, may be made as shown in Fig. 4. This form of my invention is particularly designed for use in machines employing an

even number of cylinders, since one-half of the cylinder castings used each having a barrel 1^a and two similar lugs 4^a projecting from opposite sides of its lower portion, while each of the cylinders of the other half has its two lugs 3^a projecting from opposite sides of its upper portion. With this arrangement the upper lugs of each cylinder are designed to be assembled upon two press columns, each in line with one of the lower lugs of another cylinder.

In Figs. 5 and 6, for example, I have shown a number of cylinders of the construction shown in Fig. 3, and assembled to form a three cylinder press, it being noted that with this arrangement the three columns of the press may be described as respectively lying in the edges of a triangular prism, while the cylinder castings are arranged as shown in Fig. 5, to define a triangle. Each of the columns 5 of the press is provided with a shoulder or nut 6 against which rests the under edge of one of the lugs 4 of a cylinder casting. The column passes through the bore of this lug and also receives the upper lug 3 of another cylinder casting, having on top a nut 7 whereby said two lugs are rigidly clamped in place.

In Figs. 7 and 8, I have illustrated this same type of cylinder as applied to a press having five linked cylinder castings or units, though in this case I have provided an additional cylinder casting 8 in a form unlike the others, but so arranged as to have its cylindrical plunger-receiving cavity parallel with and equidistant from the cavities 2 of the other cylinders. This second cylinder structure is provided with two similar arms 9 having detachable caps 10 whereby they are rigidly clamped to two of the columns 5, and also has a third arm 11 likewise held by a detachable cap to the body of one of the cylinder castings thus forming a diagonal tie between the columns.

In Fig. 9, I have illustrated an arrangement of cylinders constructed as shown in Fig. 4, and so mounted as to form a four cylinder press whose columns lie at the angles of a diamond shaped figure. In addition I employ a fifth cylinder casting practically similar to the others and extending between two diametrically opposite columns 5 so as to bring its cylinder in the center line of the press. In the form of machine shown in plan in Fig. 10, the cylinders are mounted on columns whose center lines lie at the corners of a square, and in this case a fifth cylinder casting 12 is provided between and connected to two diametrically opposite columns 5, thus forming a diagonal tie between the columns.

Such arrangements and numbers of cylinders as those shown in Figs. 5, 7, 9 and 10 are ordinarily used for forging or forming round blanks into tires, wheels, etc., and

when it is desired to provide a press capable of operating on long pieces of work such as car sills or the like, whose extreme length may be fifty or seventy-five feet, I may increase the number of cylinder castings, as shown in Fig. 11, in which case I have employed eleven castings of the general form shown in Fig. 4, linked together upon the necessary columns to form a linked press structure. In addition to these eleven similar castings there may be two other castings 12 of lengths sufficient to extend between two diametrically opposite columns at opposite ends of the press.

As is obvious many other forms of press may be made to suit different forms of work or material by combining similar or dissimilar castings, as desired, without departing from my invention. In Figs. 1 and 2, I have illustrated the invention as applied to a well known form of hydraulic press, there being in this case four cylinder castings employed of the general type shown in Fig. 4. The plungers 13 of all of these cylinders are connected to and operative upon the head or table 14 of the press, and any desired mechanism may be provided whereby motive fluid may be admitted to one or to any desired number of the cylinders, in order to cause the press to operate within any of a wide range of pressures. Inasmuch however, as neither the detail construction of the press, other than as described, nor that of the motive fluid distributing apparatus in themselves constitute any part of my invention, I have not described nor illustrated the same in detail.

As is obvious, if one of the cylinder castings should be found defective or become injured it may be removed and replaced with great convenience and at comparatively small expense, and it is obvious that these relatively light cylinder castings may be inexpensively made, finished and handled in a manner not possible with the large single castings hitherto employed in multiple cylinder presses.

It is to be noted that according to my invention the cylinder castings are linked together to form an endless chain; the various columns serving not only as the supporting means for the castings but also as the elements for connecting the various cylinder units.

I have found that the failure of the large castings at present used in multiple cylinder presses is largely due to the high internal pressures necessarily used as well as to the blow holes and small cracks which are almost invariably present in such castings, owing to the difficulty of obtaining perfect and homogeneous bodies of metal of the size and shape required.

Under operating conditions the high pressure water is forced with a wedging action

into such holes or cracks which may exist in the body of the casting, gradually splitting it as the opening increases in size by continued use of the press, until the casting is cracked beyond repair. By my invention a press may be equipped with any desired number of relatively small castings depending on the number of cylinders desired and these may be made of such size as to be practically homogeneous. Moreover, as above noted, a single broken casting may be replaced at a minimum of expense without requiring the replacing or serious disturbance of the remaining castings. As is obvious, such small and homogeneous castings may be easily made to resist any desired internal strains.

I claim:—

1. A hydraulic press having actuating means consisting of a plurality of independent cylinder castings linked together; and plungers for the cylinders of said castings.

2. A hydraulic press having actuating means consisting of a plurality of independent cylinder castings; columns linking said castings together; and plungers for the cylinders of said castings.

3. A hydraulic press having a table; a series of independent linked cylinder units; and plungers operating in the cylinders of said units for actuating said table.

4. A hydraulic press having a frame including columns; a plurality of cylinder castings mounted on said columns, each column engaging portions of a plurality of said castings; and plungers operating in the cylinders of said castings.

5. A hydraulic press having a frame including columns; a plurality of cylinder castings each formed for attachment to a plurality of columns; each column engaging a plurality of cylinder castings; and plungers operative in the cylinders of said castings.

6. A hydraulic press having actuating means consisting of an endless chain of cylinder castings; plungers for the cylinders thereof; and a table operatively connected to said plungers.

7. A hydraulic press including a frame having a plurality of columns; a plurality of cylinder castings each having two lugs formed to respectively fit a pair of adjacent columns, the lugs of each cylinder being

complementary to those of the cylinders adjacent thereto; with plungers operative in the cylinders of said castings.

8. A hydraulic press consisting of a frame having a plurality of columns; a series of cylinder castings mounted on and connecting the columns in the form of an endless chain; with plungers operative in the cylinders of said castings.

9. A hydraulic press consisting of a frame having a series of independent cylinder castings linked together to define a geometrical figure; with plungers operative in the cylinders of said castings.

10. A hydraulic press having a series of cylinder castings linked together to form a geometrical figure; a cylinder casting extending between the sides of said figure; and plungers operative in the cylinders of said castings.

11. The combination in a hydraulic press of a frame having a series of columns; a series of cylinder castings mounted on and linked together by said columns to form a geometrical figure; with another substantially similar casting extending between the sides of the figure outlined by said other cylinder castings; and plungers operative in the cylinders of the castings.

12. The combination in a hydraulic press of a frame having a series of columns; a series of cylinder castings each having projecting lugs bored to respectively receive a pair of adjacent columns; said cylinders being mounted in a chain on the columns and the lugs of each cylinder being complementary to those adjacent to it.

13. The combination in a hydraulic press of a frame having a series of columns; and a series of cylinder castings linked together by and mounted upon the columns, each of the castings having projecting lugs bored to receive certain of the columns, and each column being engaged by a lug extending from the upper portion of one cylinder and by a second lug extending from the lower portion of an adjacent cylinder.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

ALBERT A. LONGAKER.

Witnesses:

H. E. DERBYSHIRE,

M. ALICE FROMMEYER.

Correction in Letters Patent No. 996,992.

It is hereby certified that in Letters Patent No. 996,992, granted July 4, 1911, upon the application of Albert A. Longaker, of Chambersburg, Pennsylvania, for an improvement in "Cylinder Systems for Hydraulic Presses," an error appears in the drawing requiring correction as follows: Sheet 2, Fig. 2, lower part of the figure, the showing should conform to the showing in the same portion of Fig. 1; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 17th day of October, A. D., 1911.

[SEAL.]

C. C. BILLINGS,
Acting Commissioner of Patents.