

(No Model.)

2 Sheets—Sheet 1.

J. McNAMARA.
CENTERING FOR TUNNELS.

No. 521,767.

Patented June 19, 1894.

PLATE 1

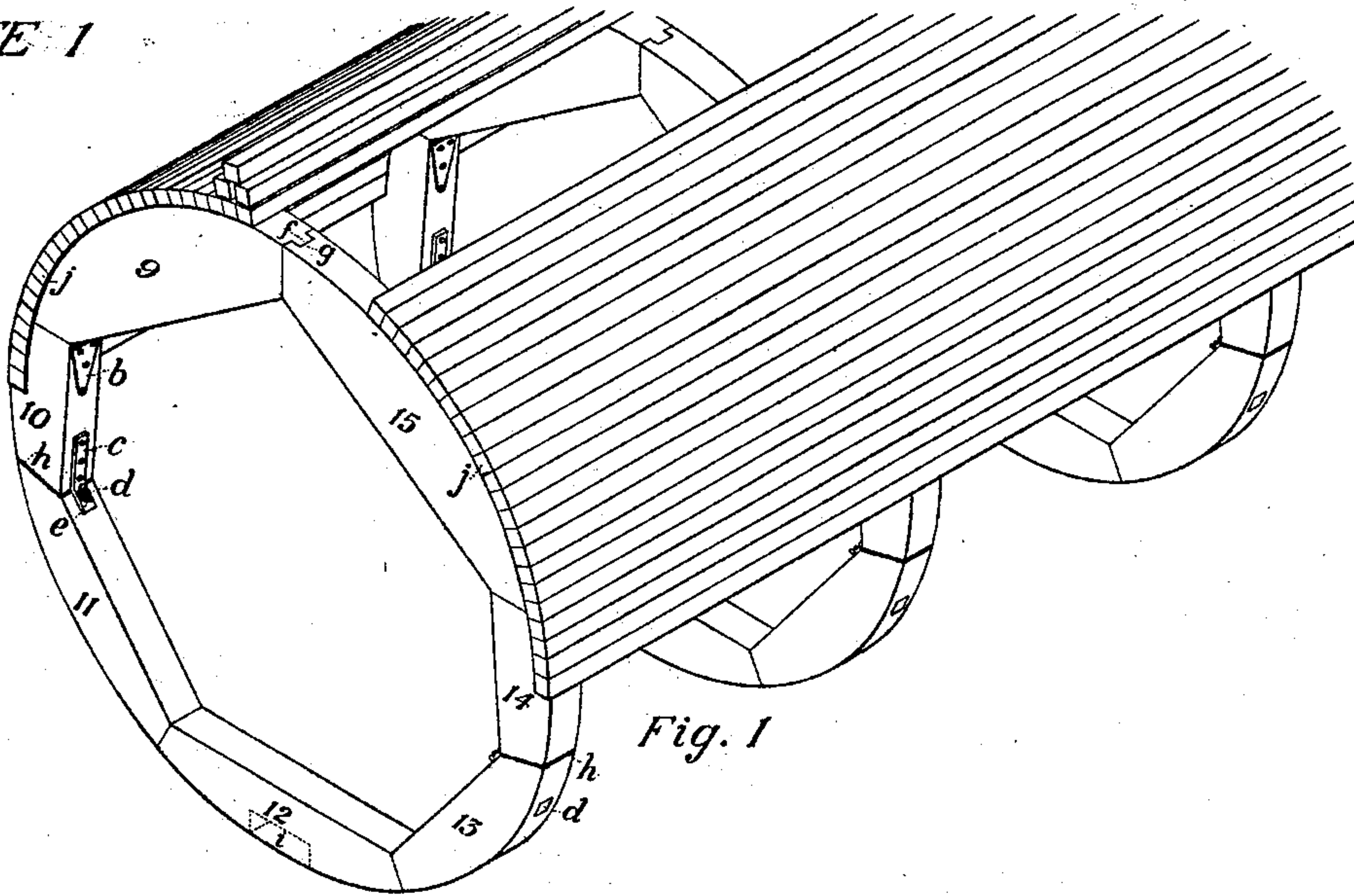


Fig. 1

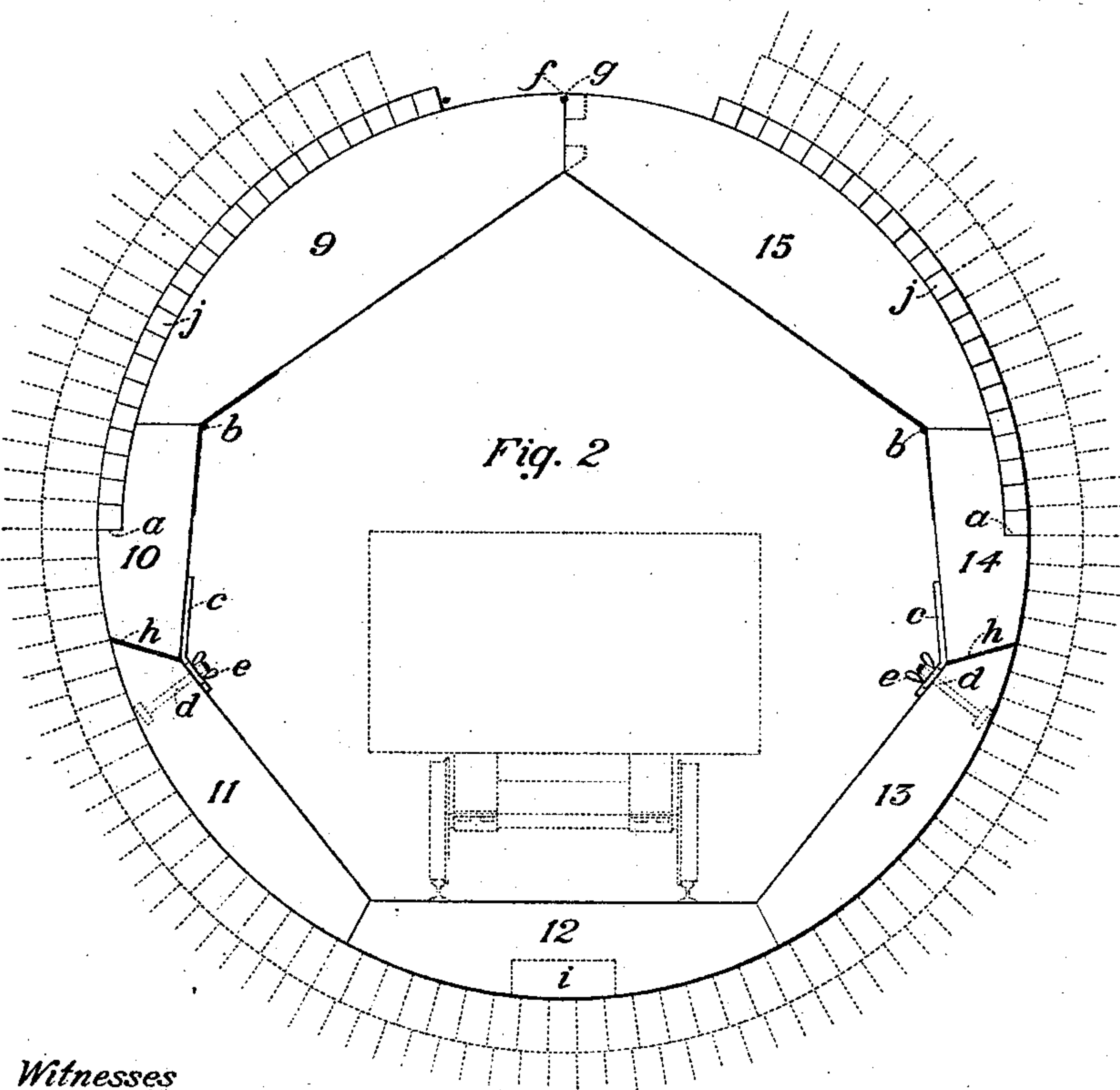


Fig. 2

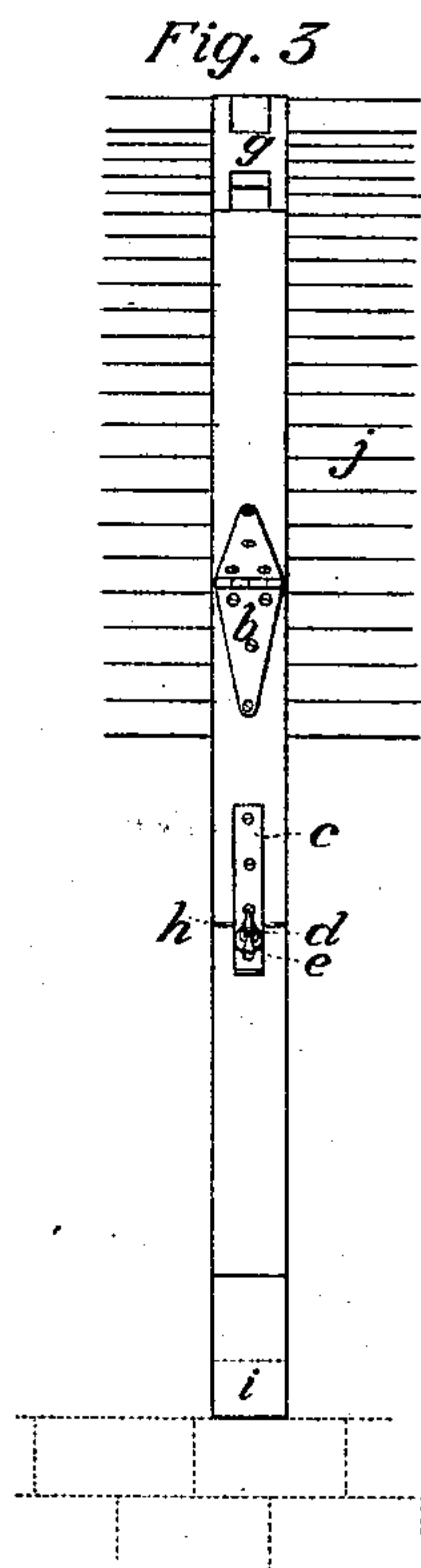


Fig. 3

Witnesses

Charles W. Turner

James B. Murphy

James McNamara

Inventor

(No Model.)

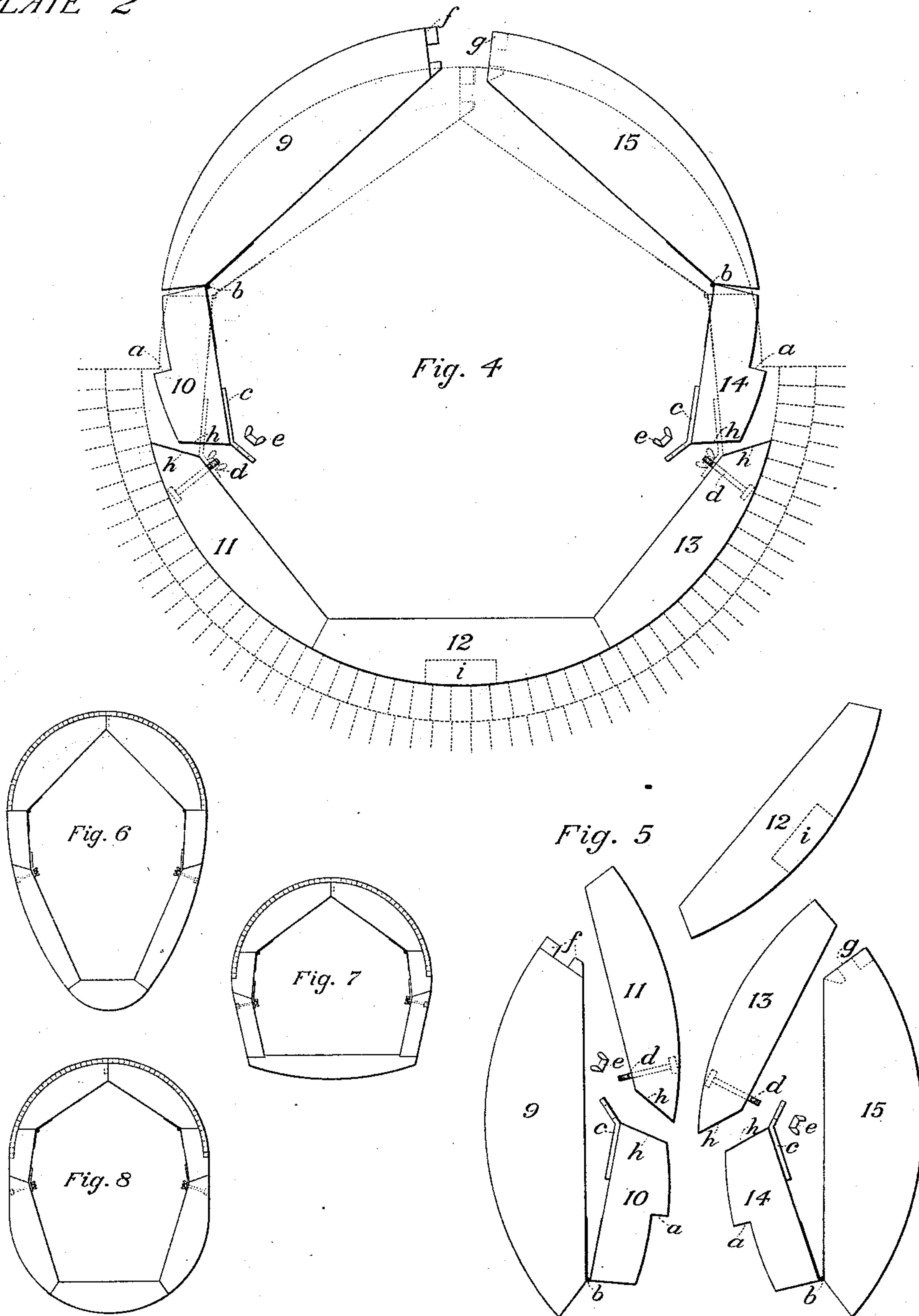
2 Sheets—Sheet 2.

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PLATE 2



Witnesses

Charles H. Turner

James B. Murphy

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THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JAMES McNAMARA, OF SEATTLE, WASHINGTON.

CENTERING FOR TUNNELS.

SPECIFICATION forming part of Letters Patent No. 521,767, dated June 19, 1894.

Application filed March 15, 1893. Serial No. 466,184. (No model.)

To all whom it may concern:

Be it known that I, JAMES McNAMARA, a citizen of the United States, residing at the city of Seattle, in the county of King and State of Washington, have invented a new and useful rib to be used in and to facilitate the construction of tunnels, sewers, or any like underground work, open or closed, or in the construction of arches in any place or in any form whatever, of which the following is a specification.

My invention relates to an improved form of supporting rib for the false work upon which the arch portion of sewers, tunnels and similar masonry work is constructed.

It consists essentially of sections so shaped that when put together they will form an arch similar in shape to the masonry arch to be built, but enough smaller to allow of placing the planks which form the lagging, outside thereof which lagging forms the immediate support of the masonry. These sections are so constructed that they may be quickly removed when the masonry arch is completed without injuring them, and may be used again in another place.

Figure 1 is a perspective view of the ribs in position part of the lagging being in position, the space at the top through which the back filling or packing is done being without its lagging. Fig. 2 is an end elevation, showing one of the ribs in place and the arch nearly completed. Fig. 3 is an inside view of the rib and lagging in place. Fig. 4 shows the rib as being placed in position. Fig. 5 shows the different sections of the ribs removed. Figs. 6, 7 and 8 show arches of other form than circular and the adaptation of my rib to their construction.

In the construction of this kind of work, the invert would first be laid, and the bottom piece 12 laid centrally thereon. This bottom piece is preferably shaped to fit the invert on the bottom and to be horizontal on the top, and if it is necessary to provide for drainage, it may have a sufficient hole or notch on its under edge to provide therefor, as shown at *i* in Fig. 2. The pieces 11 and 13 are then placed upon either side, having their ends against the ends of the bottom piece. These bring the rib up to or near the point where the arch commences and it is necessary to

support the masonry. From this point up it is necessary to use lagging to support the masonry while it is being laid. Two sections of the ribs, 9 and 14, are hinged together by the hinge *b*. These are shaped on the outside like the inner surface of the arch, but enough smaller so that the lagging when placed outside of them will make the exact size of this inner surface. These sections are long enough so that together they reach from the upper end of one of the pieces 11 or 13, to the center of the arch. Two similarly constructed pieces 14 and 15, are placed upon the other side, thus completing the rib. Where the two sections come together at the center of the arch they are provided with tenons or dowels to hold them together and prevent slipping. Except at the upper ends of the pieces 11 and 13, the joints between the sections are radial, so that they form an arch. In order that the sections may be readily taken down after the masonry arch is completed, and without injuring the sections, I have made these joints so that the sections 10 and 14 will have no difficulty in swinging clear of the sections upon which they rest when swung upon the hinges which connect them to the upper sections, the upper sections being in the meanwhile supported. To make the rib firm at this point and prevent slipping while in use, I have fixed to the upper of the two sections an iron plate *c*, which fits upon the inner edge of the lower section, and has a slot or hole in its lower end. This slot or hole fits over a bolt, *d*, which passes through or is embedded in the lower section. These are then secured together by screwing the nut upon the bolt. The adjacent ends of these two sections may be protected by iron plates, as shown at *h*. When the ribs have been placed the lagging is placed outside of them as it is needed, and the masonry arch built thereon. When the arch is completed the nuts *e* upon the bolts *d* are removed, and the section above it swung inward, and the rib is then easily taken apart and removed, and is ready for use again elsewhere. The lower section 12, may be left in place and used as a support for the rails for the cars, or replaced by ties as desired.

In using my invention back-filling may be carried on as the work progresses, but I pre-

fer to carry the work up until a space from
eighteen to twenty-four inches, or sufficient
to permit a man's working therein, remains
at the top of the arch, to be completed. The
5 filling material may then be brought in cars
and the filling put in place and tamped as
high as it is possible or convenient, and the
arch then completed by using short lagging
which will reach only from one rib to the
10 next, and the space left above the center of
the arch filled from the end. This can be
readily done, as the ribs would be only a short
distance apart, ordinarily about four feet.
The hinging in the manner shown, of the two
15 sections reaching from the arch to its center,
prevents the center of the temporary arch
formed by the rib from being raised by the
weight of the masonry, as might be done
were they not so connected.
20 This improved form of supporting rib and
the method of placing the tunnel lining here-
in described, makes the construction of such
work much cheaper and more speedy. The
false work upon which the masonry is con-
25 structed does not occupy the space so as to
prevent cars from being run through, and
when the masonry is completed it may be
readily removed without injuring it, and is
quickly set up again. The placing of the
30 back-filling and the final keying of the arch
may be left for some time after the rest of
the lining is done, and the two gangs will not
interfere with each other.

Having thus described my invention, what
35 I claim, and desire to secure by Letters Pat-
ent, is—

1. A rib to be used in the construction of

tunnel linings composed of sections in which
the joints are in the main radial so that they
will form a self supporting arch, but having 40
one or more of the joints making an angle
with the radial plane, and means for locking
together the sections on either side of this
joint, substantially as shown and described.

2. A rib to be used in the construction of 45
tunnel linings, composed of sections in which
the joints are in the main radial so as to act
as an arch, but having one or more of the
joints at such an angle with the radius that
one of the sections adjoining may be with- 50
drawn toward the center, and means for lock-
ing and unlocking the sections at this joint
at will, substantially as shown and described.

3. A rib to be used in the construction of
tunnel linings, composed of sections which, 55
up to the springing of the arch, are, upon
their outer surface, shaped to fit the inner
surface of the lining, and above this point are,
upon their outer surface, shaped to a contour
parallel to the inner surface of the lining, 60
and sufficiently smaller to just accommodate
the lagging between, the joints between the
sections being radial and such that they will
act as an arch, except those at the springing
of the arch, which are shaped so that one of 65
the sections adjoining may be withdrawn to-
ward the center, and means for locking and
unlocking the sections at these joints at will,
substantially as shown and described.

JAMES McNAMARA.

Witnesses:

J. LEE,

I. D. McCUTCHEON.