

No. 776,252.

PATENTED NOV. 29, 1904.

M. MÖLLER.
ABUTMENT FOR ARCHES.
APPLICATION FILED JULY 6, 1904.

NO MODEL.

Fig:1.

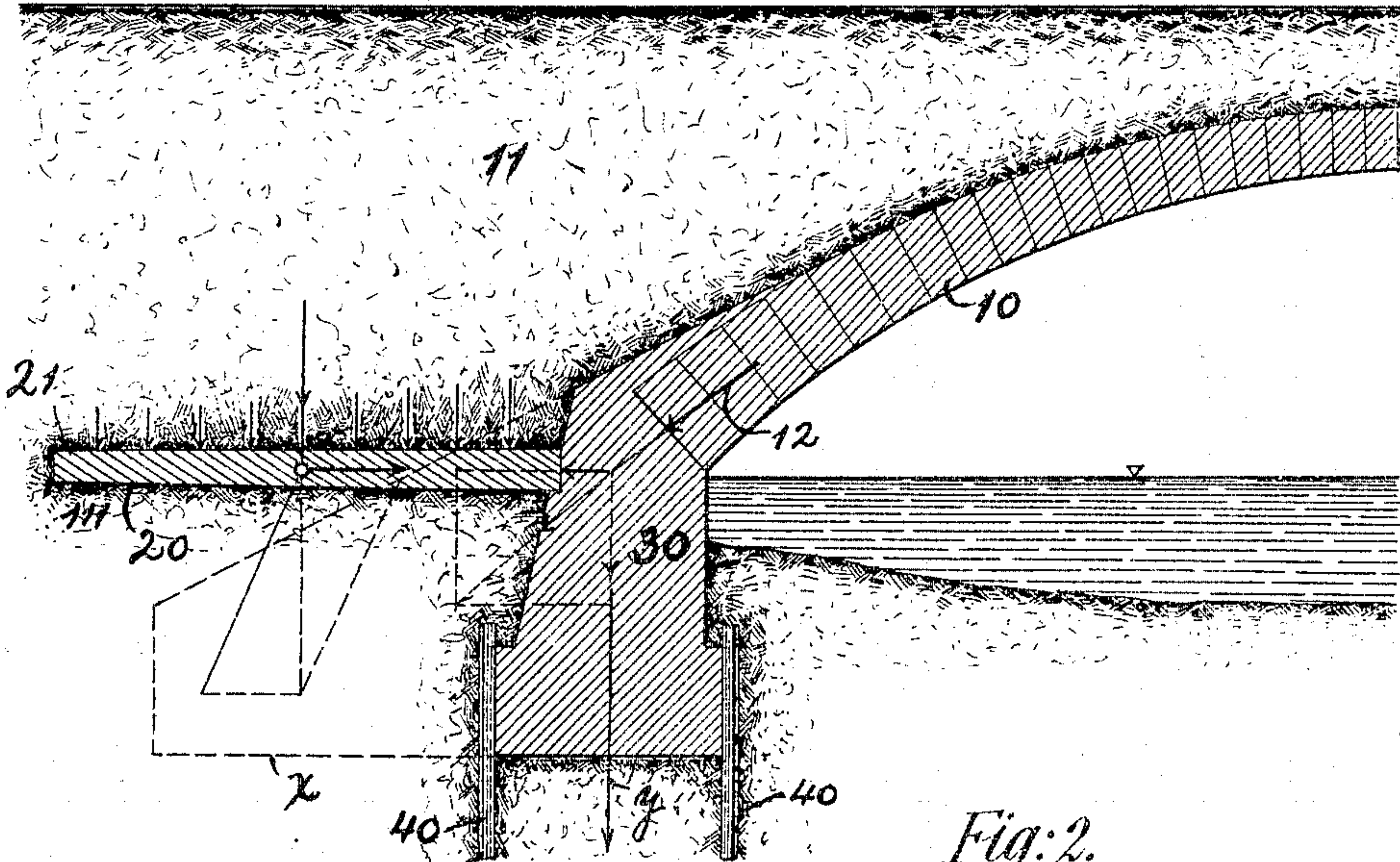
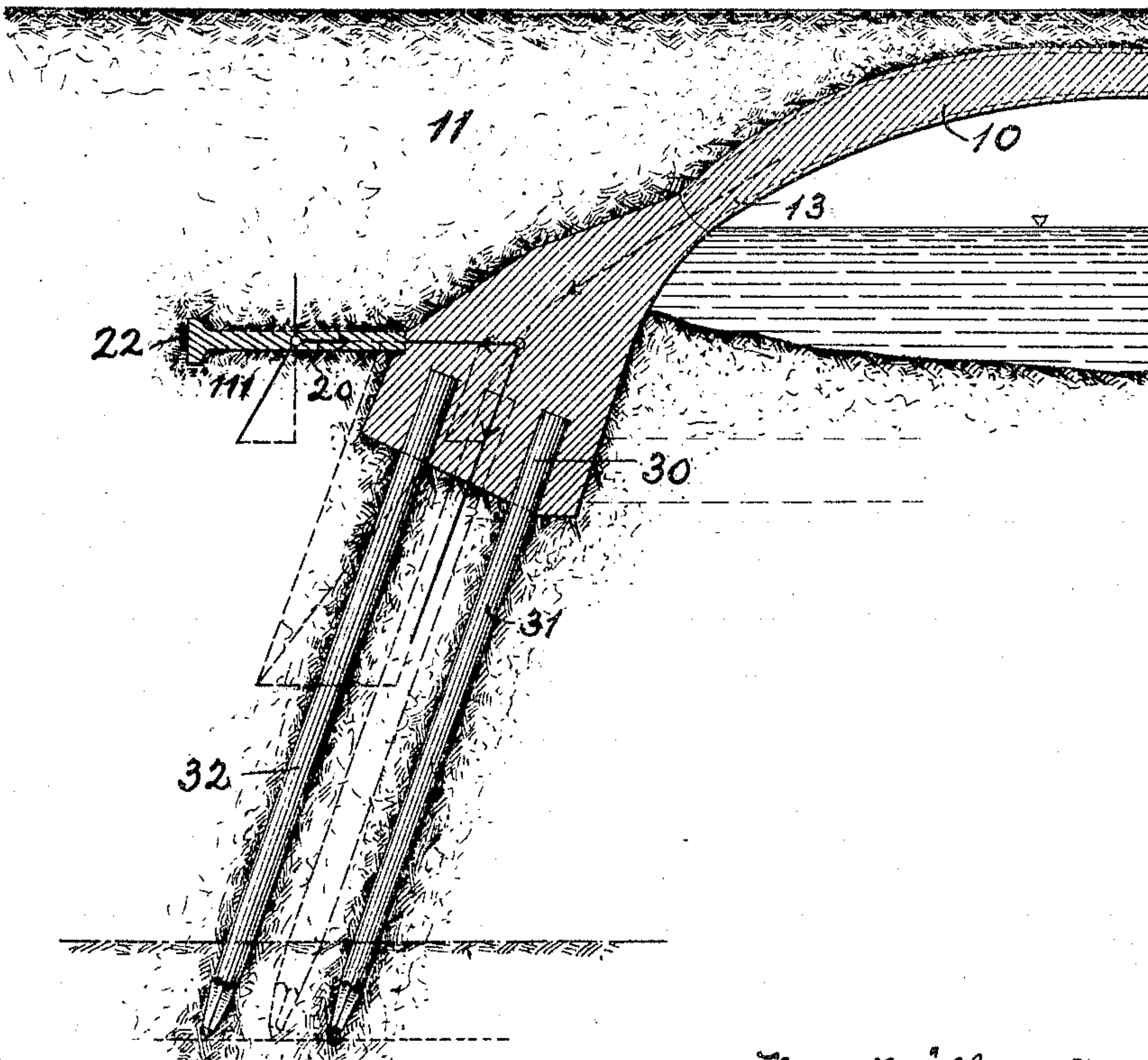


Fig:2.



Witnesses
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UNITED STATES PATENT OFFICE.

MAX MÖLLER, OF BRUNSWICK, GERMANY, ASSIGNOR TO WILLIAM MUESER, OF NEW YORK, N. Y.

ABUTMENT FOR ARCHES.

SPECIFICATION forming part of Letters Patent No. 776,252, dated November 29, 1904.

Application filed July 6, 1904. Serial No. 215,536. (No model.)

To all whom it may concern:

Be it known that I, MAX MÖLLER, professor, a subject of the Duke of Brunswick, Germany, residing at Brunswick, Germany, have invented certain new and useful Improvements in Abutments for Arches, of which the following is a specification.

My invention relates to abutments for arches; and its novelty consists in the means employed to counteract the thrust of the arch, as will be more fully hereinafter pointed out.

In the drawings, Figure 1 represents in vertical section the end of an arch provided with my improved abutment, one member of which is vertical; and Fig. 2 represents a similar view of an arch in which there is shown my improved abutment with two members at an acute angle to the horizontal member.

Heretofore arches have been built provided with abutments designed to resist the thrust of the arch along the line of pressure, the abutment being made large and massive enough to accomplish the desired purpose and of a shape commonly trapezoidal or the like, as indicated in dotted outline at *x* in Fig. 1, the principle governing the size and location of the abutment being that the line of pressure of the arch shall strike the foundation of the abutment well inside of the middle third of the total depth of the latter. Such abutments are of necessity large and costly.

It is the purpose of my invention to diminish the size and lessen the expense of abutments of this class, and, in brief, I accomplish it by making the abutments of two members the axes of which shall coincide substantially with horizontal and vertical lines of which the line of pressure of the arch is the resultant. In this manner the horizontal and vertical thrust are taken care of and the necessity for building such massive abutments as heretofore is avoided.

In the drawings, 10 is an arch of any approved construction.

11 is the fill in back of the arch composed of soil or any suitable material. The arrow 12 indicates the direction of the line of pressure in Fig. 1, and the similar arrow 13 indicates the same line in Fig. 2.

Adjacent to the arch and in a substantially

horizontal position is arranged a plate or member 20, composed of any suitable material—as, for instance, stone similar to the material of which the arch itself is composed. This plate 20 is laid upon the portion of the soil 111 immediately beneath it, and the fill is placed over it so as to cover it. It must be made of sufficient depth to be strong enough to resist the weight of the fill above it, and it should be as wide as may be found necessary up to the width of the arch. The plate may also be made tapering slightly toward its extremity or edge 21 away from the arch in order to increase the friction between it and the materials on each side of it, so as to assist in resisting the horizontal thrust, or it may be made with an expanded extremity 22, as shown in Fig. 2, for the same purpose. At an angle to the member 20 is shown the second member 30 of the abutment. This may be made integral with the end of the arch, as shown in Fig. 1, or simply embedded therein or adjacent to it, as shown in Fig. 2. It should be sufficiently large in size to reach with its foundations into firm soil and should be arranged so as to take the vertical or downward thrust of the arch. In Fig. 2 it is shown made of two long piles 31 and 32, while in Fig. 1 it is simply a mass of masonry. In Fig. 1 the axis *y* of the mass is vertical, while in Fig. 2 the axes of the piles (which together are the equivalent of a mass of masonry) are at an acute angle with the longitudinal plate 20 and yet do not sufficiently depart from a vertical line to defeat their purpose of resisting the downward thrust.

The plate 20 does not need any foundation, since a vertical movement, due to settling, may occur in it, or it may even be ruptured without loss of the function of resisting horizontal pressure. This plate should be placed at such a height that it should meet the arch where the line of pressure reaches the confines of the latter.

In Fig. 1 there is shown a coffer-dam or cribwork 40, adapted to confine the vertical member of the abutment 30. This construction is useful where the soil is of a loose and yielding nature.

My invention has great practical advantages.

tages. It is much cheaper than the method of building ordinary masonry abutments in one piece, because it effects a saving in excavation and masonry. It also enables an arch to be
5 built closer to existing buildings, as the plate 20 may frequently be placed above the foundations of such buildings and yet be at the proper place to accomplish its desired functions. In existing arches, moreover, where the abut-
10 ments are insufficient to resist the horizontal thrust and there is a tendency to rupture this horizontal plate 20 may be inserted and such destructive tendency checked.

What I claim as new is—

15 1. An abutment member for arches, consisting of a plate placed in a substantially horizontal position in contact with the end of the arch adjacent to its pressure-line.

20 2. An abutment for arches, comprising two members, one horizontal and adapted to resist the thrust in that direction, and one vertical and adapted to resist the thrust in that direction.

25 3. An abutment for arches, comprising two members, one horizontal and adapted to re-

sist the thrust in that direction, and one vertical and adapted to resist the thrust in that direction, the two members being each adjacent to the termination of the pressure-line of the arch.

30 4. An abutment for arches, comprising two members, each placed in contact with the end of the arch near its pressure-line, one member being substantially horizontal and the other member being at an angle thereto and adapted
35 together to resist the pressure of the arch.

5. An abutment for arches, comprising two members, each arranged at the end of the arch, one arranged substantially horizontal and the other at an angle thereto whereby
40 their respective axes are in lines of which the line of pressure of the arch is the resultant.

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

MAX MÖLLER.

Witnesses:

HEINR. FRANZ SCHMITZMANEY,
WILHELM LEHRKE.