C. C. FINLAYSON & J. N. CAIN.

TUNNEL SUPPORT.

APPLICATION FILED OCT. 27, 1909.

963,536.

Patented July 5, 1910.

Fig. 2.

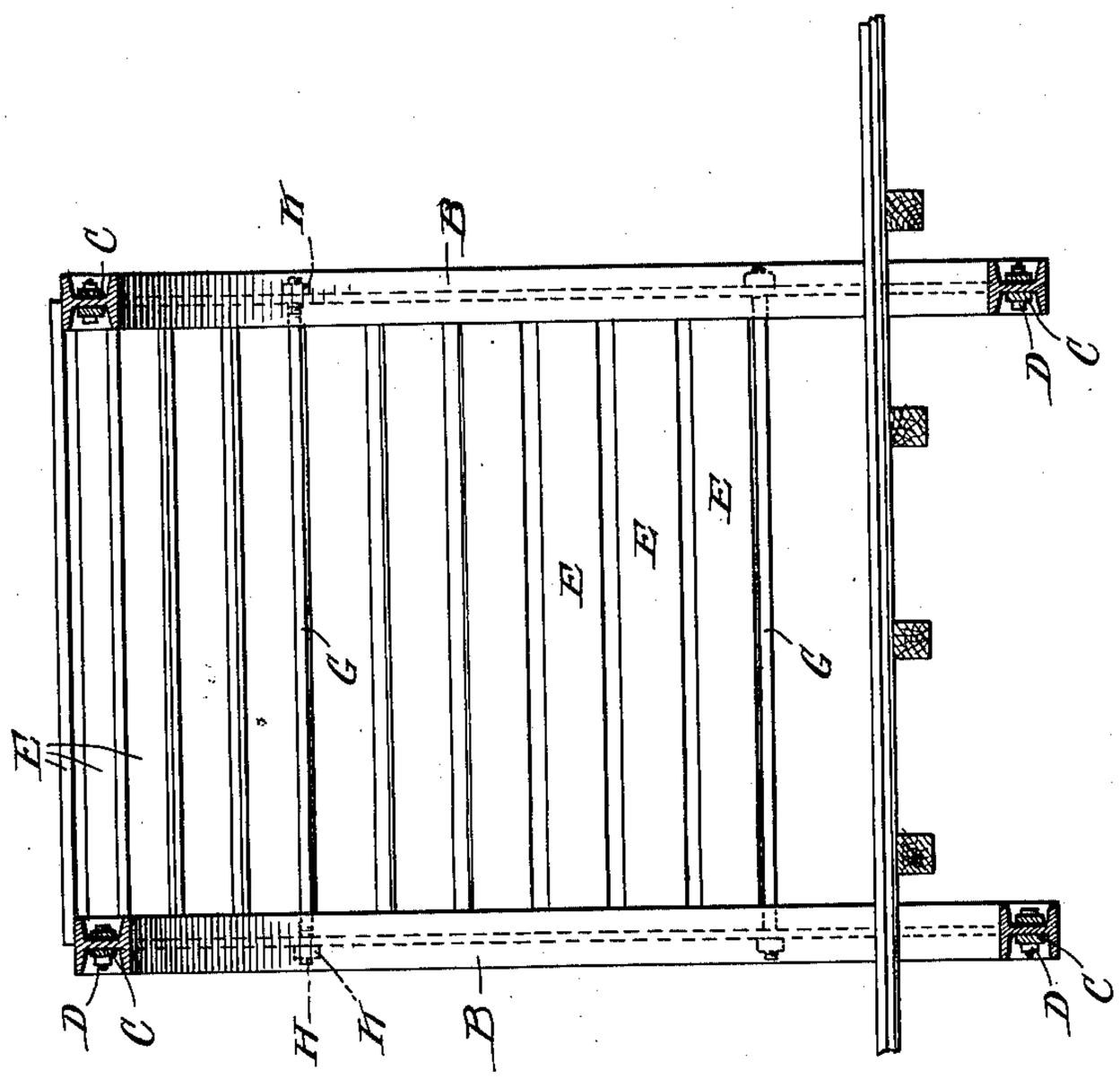
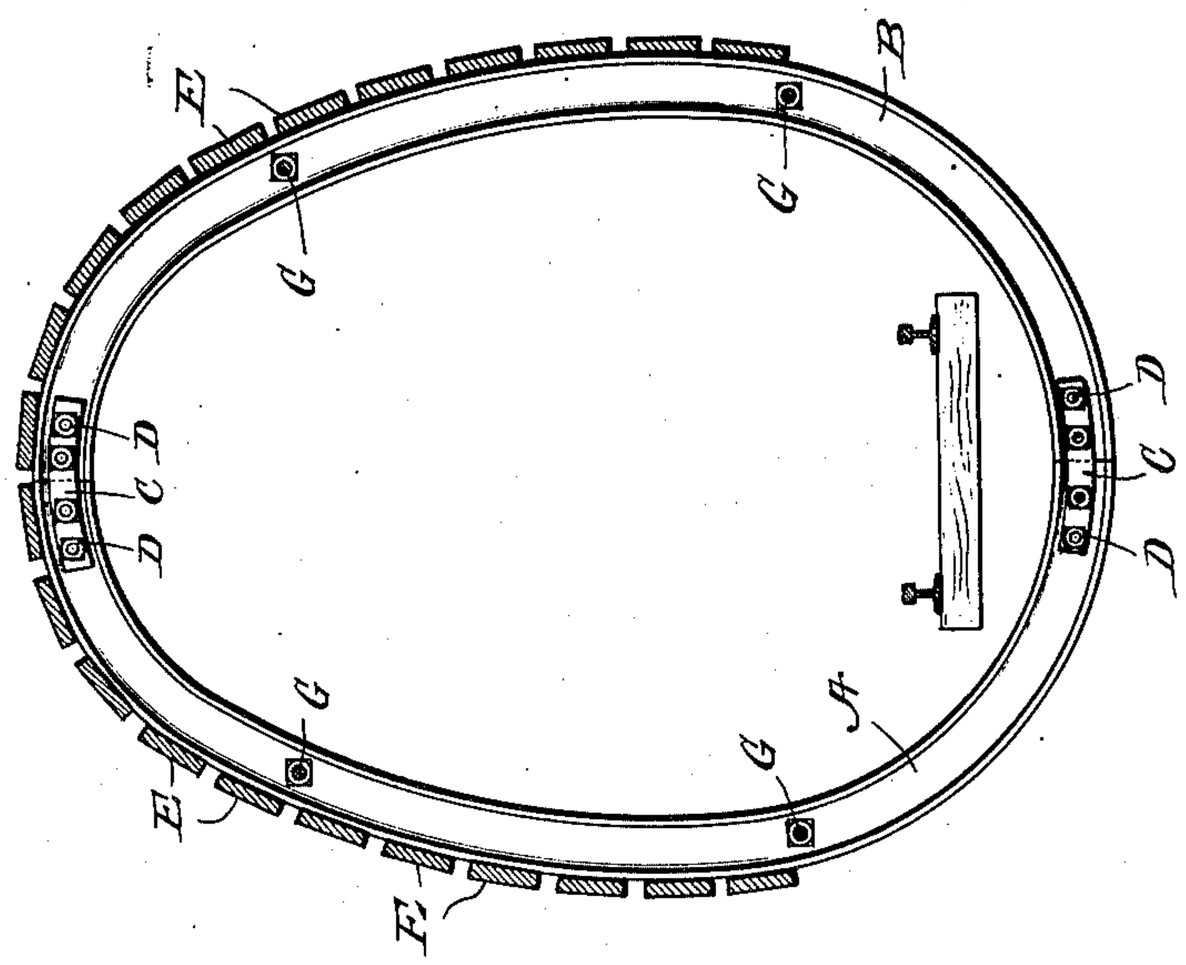


Fig. 7.



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TUNNEL-SUPPORT.

963,536. Specification of Letters Patent. Patented July 5, 1910.

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To all whom it may concern:

Be it known that we, CHRISTOPHER C. FINLAYSON, a citizen of the United States, and JAMES N. CAIN, a subject of the King of England, and residents of Bisbee, in the county of Cochise and Territory of Arizona, have invented certain new and useful Improvements in Tunnel-Supports, of which the following is a specification.

Our invention is an improvement in tunnel supports, and consists in certain novel constructions, and combinations of parts, hereinafter described and claimed.

The object of the invention is to provide an improved form of drift support for mining purposes, which will be strong, durable and economical in construction, which will consists of few parts, and which may be cheaply constructed, and will require no change in the usual methods of mining.

Referring to the drawings forming a part hereof, Figure 1 is a transverse section of a section of the improved support, and Fig. 2 is a vertical section.

In driving drifts or tunnels in metal mining, the walls of the tunnel are subject to pressure from every side, and the support for the wall should be approximately equal in every direction. The heaviest pressure is however vertically downward, and the next heaviest vertically upward, while of course the pressure on each side of the tunnel or drift is approximately the same. A perfect support must necessarily have the greatest power of resistance in the directions above set forth. The supports ordinarily used are in sections of six or seven feet in length, and are placed as soon as the material is excavated, or in some cases a portion of the section is placed before the excavation is commenced. The embodiment of the invention shown in the drawings is adapted to be constructed and used in the same manner, and comprises a plurality of substantially elliptical metal frames, which form the base of the support, and a system of lagging or siding in connection with the frames.

Each of the frames is composed of I bars, and is formed in two similar sections A and B, and the ends of the sections are connected by fish plates C, and bolts D, the plates being lapped on the adjacent ends of the sections, and the bolts passed through registering openings in the plates and I bars.

The complete frames are substantially egg-shaped as shown in Fig. 1, and are arranged transversely of the drift or tunnel, with the large end downward, at intervals of six or seven feet. The lagging consisting of strips E is placed longitudinally of the drift, with the ends of the strips engaging the frames. Each strip engages one frame with one end, and the adjacent frame with the other, and the strips are spaced apart slightly laterally, and are omitted at the bottom and for a short distance up the sides. The arrangement is however in accordance with the conditions, and in some cases it might be necessary to make the lagging complete. The frames are also connected with each other by means of rods G having threaded ends H which extend through registering openings in the frames, and are engaged by nuts K. The bolts prevent lateral movement of the frames, thus preventing displacement of the lagging.

In using the improved structure, the sections of the frame are placed, and secured together by the fish plates and bolts. The bolts G are then inserted, and secured in place by the nuts K, after which the lagging E is placed in position. The ties M are placed, usually on the floor of the tunnel, and the rails N are secured to the ties in the usual manner. When the lagging is omitted from the bottom of the frames, the said bottoms may be sunk in the floor of the tunnel.

It will be evident from the description that each frame is substantially oval in form and consists of a plurality of arches, each of which is especially shaped for the relative amount of pressure to which it will be subjected. At the top the radius of the arch is short, while at the sides it is long, thus providing a maximum amount of strength and head room with a minimum of material. The radius of the bottom arch is also greater than that of the top arch.

We claim:

1. A tunnel or drift supporting structure comprising a plurality of frames, each of which is composed of four arches, the radius of the end arches being of lesser length than the radius of the side arches, and the radius of the lower end arch being of greater length than that of the upper arch, each of said frames being divided at its top and bottom into substantially similar sections, fish plates overlapping the adjacent ends of

the sections, and bolts securing the fish plates on the sections, bolts connecting the frames, and a plurality of strips each having its ends engaging adjacent frames.

2. A structure of the character specified, comprising a plurality of substantially oval frames, arranged with their large ends downward, said frames being I-shaped in cross section, and each being divided vertically into sections, means for detachably connecting the ends of the sections, a connection between the frames, and lagging consisting of parallel strips engaging the outer faces of the frames.

3. A structure of the character specified, comprising a plurality of frames, each of which is oval in form and presents a convex surface at every point of its periphery, a connection between the frames, and a covering for the frames.

4. In a structure of the character specified, a substantially annular frame, oval in form, and presenting a continuous curve.

5. In a structure of the character specified, an annular frame whose sides are formed on equal arcs, the base on an arc of less radius than the arc of the sides, and the top on an arc of less radius than the arc of the base.

6. In a structure of the character specified, an annular substantially elliptical frame, one end of the frame being formed on an arc of greater radius than the other.

7. In a structure of the character specified, a supporting frame, annular in form, and formed from a plurality of arcs merging into each other at their ends, the arc of the base being of greater diameter than the arc of the top.

8. A frame substantially as herein described in oval form with its major axis vertical and having its lower or base portion arched downwardly.

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