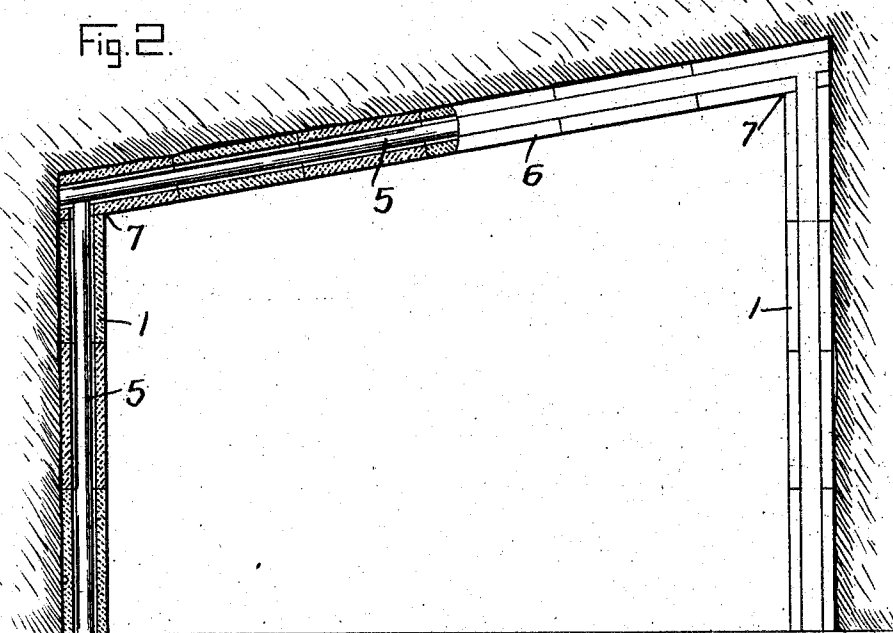


APPLICATION FILED JUNE 16, 1909.

2 SHEETS--SHEET 1.



Attorneys

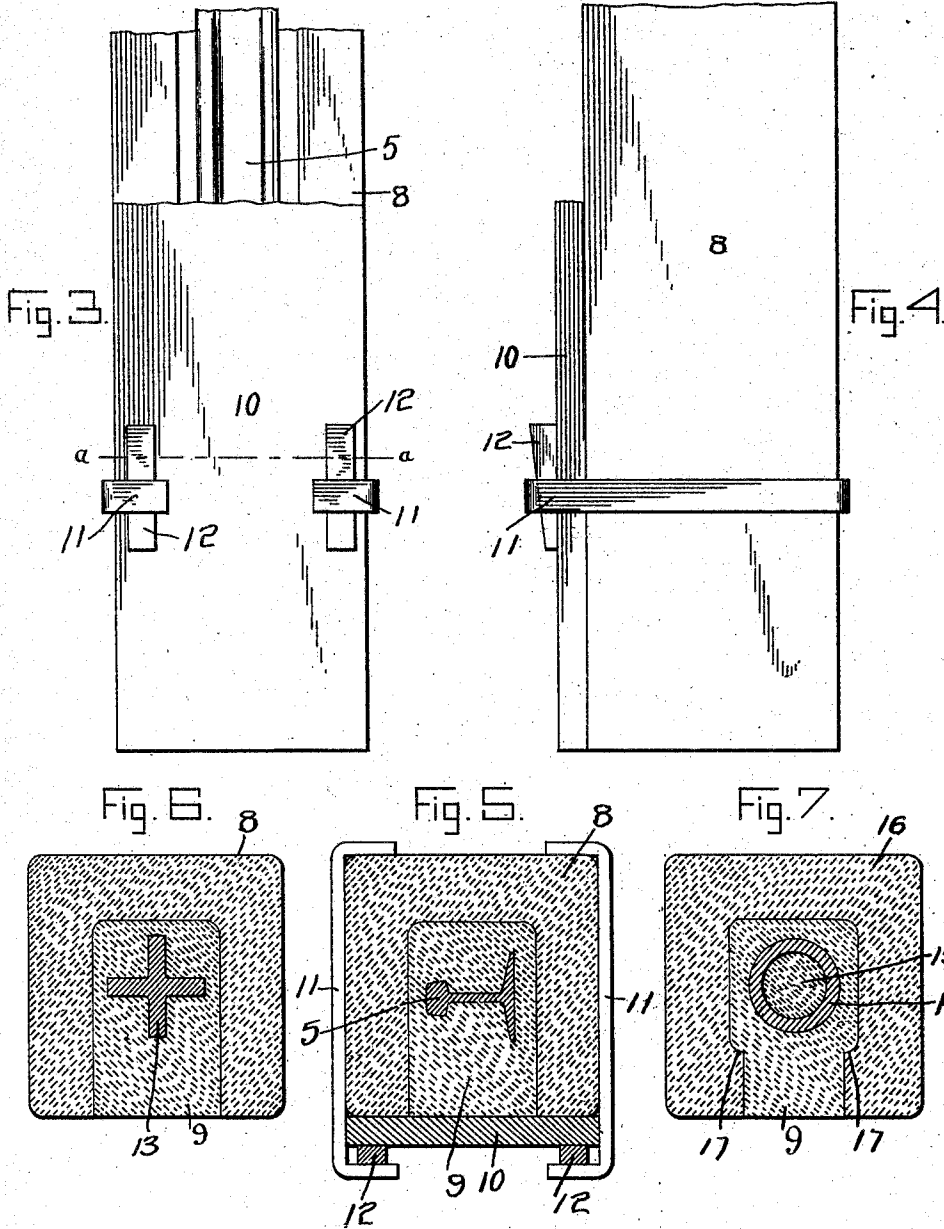
J. G. SANDERSON & C. B. STURGES.
MINE ROOF SUPPORT.

APPLICATION FILED JUNE 16, 1909.

Patented Jan. 10, 1911.

2 SHEETS—SHEET 2.

981,226.



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UNITED STATES PATENT OFFICE.

JAMES GARDNER SANDERSON AND CLARENCE B. STURGES, OF SCRANTON, PENN-
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MINE-ROOF SUPPORT.

981,226.

Specification of Letters Patent.

Patented Jan. 10, 1911.

Application filed June 16, 1909. Serial No. 502,601.

To all whom it may concern:

Be it known that we, JAMES GARDNER SANDERSON and CLARENCE B. STURGES, citizens of the United States, and residents of Scranton, in the county of Lackawanna and State of Pennsylvania, have invented certain new and useful Improvements in Mine-Roof Supports, of which the following is a specification.

The present invention relates to supports for the roofs of mines and similar excavations, and has for its purpose to provide such a means constructed of concrete sections, adapted to have reinforcing means, the several parts whereof are assembled in their permanent form at precisely their place of use.

The invention is designed with the especial view of displacing the present used types of supports of this character, wherein said supports are of timber and in consequence thereof deteriorate with time and exposure to the elements, thereby rendering the same unsafe in use. With the concrete structures now employed, the same usually consists of a post or pillar constructed on the spot, but which is defective in that it is an obstruction in the passageway. Another, and often used support, is that of permitting a column of coal to remain in its natural state and thus provide a support for the roof. This method is likewise at fault, in that the coal constituting the support is wasted.

By our improved roof support, all of the available coal may be mined and there is at all times a complete clearance through the tunnel, and there is the further advantage that the strength of the structure increases with time.

With these as the essential advantages, there are other points of merit in the invention in question, which points will be clear from the course of the following extended description and as set forth in the claim.

In the accompanying drawings, which show our invention in its preferred embodiment, Figure 1 is a view through a section of a mine showing the support in position; said structure being shown partly in section; Fig. 2 is a part elevation and part sectional view of a modified form of structure; Fig. 3 is a detail view of one of the concrete blocks provided with a reinforcing bar but not filled with concrete; Fig. 4 is a

side elevation of Fig. 3; Fig. 5 is a transverse sectional view of Fig. 3, taken along the line *a-a* with the central part filled with concrete; Fig. 6 is a similar view showing a modified form of reinforcing bar; and Fig. 7 is a modified form of concrete block provided with a further modified reinforcing bar.

Referring to the several figures in detail, wherein like numerals of reference indicate corresponding parts in the different views shown, 1 designates the vertical supports or end posts which are built up against the side walls of the tunnel or shaft in precisely the manner shown in Fig. 1. These supports are built to such height as will bring their upper ends into immediate contact with the upper sides of the roof as indicated by the numeral 2, and in which position they provide a direct brace or pillar for that section of said roof. Connecting the side posts 1 is an arch 3 constructed in precisely the same manner as the pillars 1, but varying in design whereby to form an arch, the supporting ends 4 of which are seated within complementary recesses formed within said end posts. That space between the arch structure 3, the pillars 1, and the wall of the excavation is adapted to be filled with rocks 3' or the like whereby to give the proper bearing means to the supporting structure. Each of the pillars 1 and the arch 3 may be constructed of concrete blocks alone, the union of the several blocks being made effective into one structure by a cement filling, for which purpose the several blocks are suitably adapted to receive the cement, as will be hereinafter described, and to reinforce the structure when built along the lines just indicated, the hollow space provided by the several blocks when assembled, may have embedded within the cement filling reinforcing bars 5, of which there would be one or more for each of the side pillars and one or more for the arch 3. This form of structure will likewise be presented at length in the following description.

As an alternative to the structure shown in Fig. 1, that shown in Fig. 2 may be employed. In this instance, the side posts or pillars 1 are erected in precisely the manner described of the same parts in Fig. 1, but instead of the arch structure 3 the straight girder or lateral support 6 is used. In this

instance, the ends of the support rest squarely upon the upper ends of the posts 1, as indicated by the numeral 7. This type of structure may be, as in the other instance, 5 constructed of concrete and cement alone, or with the reinforcing bars 5, as preferred.

The several sections or blocks from which the structure is built, comprises each a block 8, whose design herein shown in cross-section is substantially that of a U, and is preferably molded from concrete or such other 10 appropriate material as would have the required supporting qualities and durability. These blocks may have other than U-shaped 15 section, so constructed as to allow of the insertion of a continuous metal reinforcement to be embedded in a cement mixture. These concrete blocks are presumably molded at any place convenient to their position for 20 erection, and have such length as would render the same convenient to handle. The space within the blocks 8 is adapted to receive the cement filling 9 when the several blocks are assembled in respective alinement, 25 and which with the hardening of the cement forms the several blocks into a substantially single structure. For the purpose of filling the cement within the space of the blocks 8 and holding the same therein until such 30 time as it has become sufficiently hardened, a number of retaining boards or plates 10 are employed, which boards in their manner of application are held against the open ends of the blocks by bracket arms 11, which 35 engage against the rear face of said blocks, and by means of wedges 12 hold the retaining boards in position. Instead of that form of reinforcement 5 shown in Fig. 5, which in this instance is merely the utilization of 40 such track rails as are otherwise unserviceable, the type of reinforcement 13 shown in Fig. 6 may be employed, or as a further alternative a pipe 14 may be used with equal effectiveness. In this latter instance, the 45 bore of the pipe may be filled with cement 15.

The design of block 16 shown in Fig. 7, is in all respects similar to the one heretofore mentioned, excepting that the recess or 50 filling space is enlarged to provide the shoulders 17 that serve as an additional strengthening or retaining means for the concrete.

In building a structure of the arch design, the reinforcing bars for the side pillars are

first positioned, after which the reinforcing 55 element of the arch is likewise fixed, being secured to the side reinforcing elements by bolts or otherwise. Upon this frame-work, the several concrete blocks 8 are assembled, and when the same are all in position, the 60 hollow space or tunnel, and the space between the blocks, are filled with the cement which is held until it becomes hard in the manner above explained. This structure is then left for the necessary time, when the 65 temporary means is removed and the plastic structure remains permanent. In the building of that structure shown in Fig. 2, the operation is about the same, only that it is not necessary to secure together the several 70 reinforcing bars.

In either of the structures built as above described, the cement filling constitutes of itself a virtually integral or unbroken arch. 75 And there is the further advantage that this filling, by reason of being exposed in the manner it is, may be readily cut away or otherwise removed, either for replacing the filling or for removing the structure entirely.

When no reinforcing means are employed, 80 the structure when erected is temporarily supported by any suitable means, such for instance as staging, etc.

Where it is desired to erect independent props or columns without the arch or girder, 85 the construction would be the same as shown in the vertical side posts herein.

What is claimed is:—

A structure of the character described comprising end pillars, a cross girder sup- 90 ported thereon, said pillars and girder comprising a plurality of blocks having channels therein exposed outwardly and adapted to aline and receive a plastic filling, and a reinforcing bar for each of said pillars and 95 girder coextensive in length therewith, the girder reinforcing bar being supported by the pillar reinforcing bars, said bars embedded within the plastic filling.

The foregoing specification signed at 100 Scranton Pennsylvania this 4th day of May, 1909.

JAMES GARDNER SANDERSON.
CLARENCE B. STURGES.

In presence of two witnesses:

JESSE DIMMICK,
M. M. REESE.