

W. BREIL.
MINE SHAFT LINING.
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1,051,076.

Patented Jan. 21, 1913.

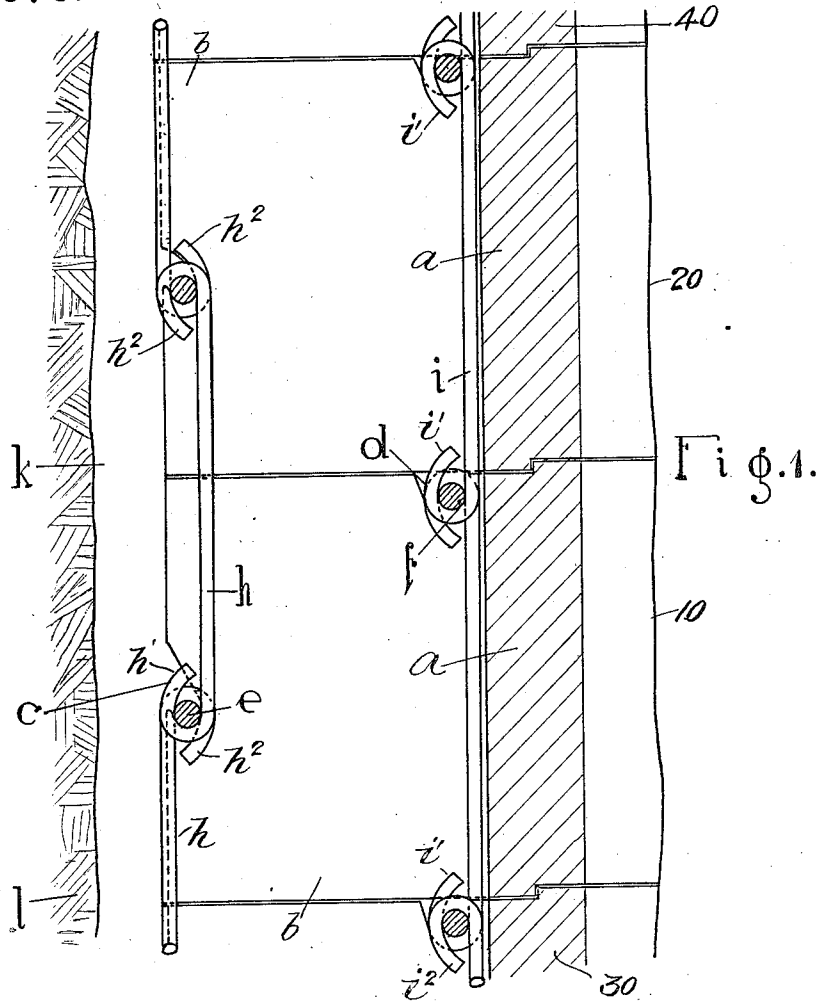
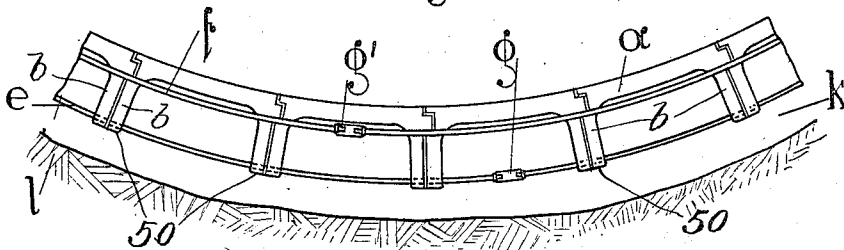


Fig. 2.



Witnesses:

James Fick
John Murtagh

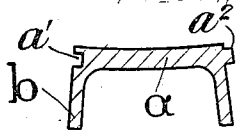


Fig. 3.

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MINE-SHAFT LINING.

1,051,076.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILHELM BREIL, a subject of the German Emperor, and a resident of Essen-on-the-Ruhr, Germany, have invented certain new and useful Improvements in Mine-Shaft Linings, whereof the following is a specification.

This invention relates to the construction of reinforced concrete linings for mine shafts and the like.

The object of the invention is to provide for the construction in an economical manner of shaft linings of this character of strength and resistance.

Figure 1 of the accompanying drawings represents a vertical cross section through one side of a shaft embodying one form of this invention. Fig. 2 represents on an enlarged scale a top plan view of a segment of the structural part of this lining before the concrete is applied thereto. Fig. 3 represents on the same scale a section of one of the plates constituting a part of the inner facing of this improved shaft lining.

The same reference characters indicate corresponding parts in all the figures.

In constructing this shaft lining an inner facing is first built up within the excavated shaft at some distance from the wall of the excavation. This facing comprises a series of superposed rings as 10, 20, 30 and 40, each ring being composed of segmental plates *a* constructed of concrete or equivalent material. These plates are preferably provided at their opposite ends with recesses *a'* and projections *a''* which form interlocking joints. The plates are also provided at their opposite ends with lateral radial flanges *b* which project outward a considerable distance from the webs of the plate. When the plates are put together to form the ring as indicated in Fig. 2 the radial flanges *b* of one plate fit against the radial flanges *b* of the adjacent plates and form external vertical ribs 50 at the outer periphery of the ring. The superposed rings so constructed are preferably arranged so as to break joint and when so arranged the ribs of the different rings are in staggered relation. The flanges *b* are preferably provided with two sets of transverse holes *c* and *d* disposed at different distances from the web of the plate. The holes *c* are preferably in the form of notches disposed in the outer vertical edges of the flanges intermediately between the top and bottom of the plate and the holes *d*

are preferably in the form of notches disposed in the tops of the flanges near the body or web of the plate. When the segmental plates *a* are united in a ring and the flanges thereof form ribs, like notches of each flange register with the notches of the adjacent flange. A tension band *e* is applied to and made to surround each ring at the outer edge of the ribs *b* thereof, being disposed in the notches *c* and spanning the spaces between said ribs at a considerable distance from the body of the ring. The meeting ends of this band are screwthreaded and connected by a turn buckle *g* whereby the tension of the band is adjusted and the plates *a* bound firmly together circumferentially. Another tension band *f* is applied and made to surround the plates *a* constituting a ring, being disposed in the notches *d* or passed through them. The meeting ends of this band are screwthreaded and connected by a turn-buckle *g'*, whereby the band is tightened to the desired tension. This band thus extends over the ribs formed by said flanges *b* near the bases thereof and extends through the recesses between said ribs at a slight distance outward from the webs or bodies of the plates aforesaid. The tension bands *e* and *f* are thus arranged relatively in alternation as shown in Fig. 1, the bands *e* being opposite the spaces between said bands *f*. Each band *e* of one ring is connected with the band *e* of the ring above and also with the band *e* of the ring below. For instance the band *e* of the ring 10 is connected with the band *e* of the ring 20 by means of a series of vertical rods *h* having hooks *h'* *h''* at their opposite ends respectively. The hook *h'* at the lower end engages the band *e* of the ring 10 and the hook *h''* at the upper end engages the band *e* of the ring 20. Similar hooked vertical rods *h* connect the rod *e* of said ring 10 with the corresponding rod *e* of the ring 30 below and so on. The tension bands *f* are likewise connected by means of vertical rods *i* having hooks *i'* at their lower ends and hooks *i''* at their upper ends. These connecting rods are arranged in a manner similar to the arrangement of the rods *h* in connection with the bands *e*.

After the inner facing of the lining is built up and tensioned as above, a filling of concrete is inserted in the space *k* between the wall *l* of the excavation and said built up structure. The concrete fills the spaces between the ribs formed by the flanges *b*

and forms an outer layer surrounding the cylindrical facing aforesaid. The staggered ribs of the rings are locked in position by the concrete mass. The tension bands and connecting rods thereof become embedded in the mass of concrete which sets around them, and the bands thus perform the double function of tensioning the built up inner facing and reinforcing the surrounding layer of concrete.

I claim as my invention:

1. A lining for excavated shafts comprising a cylindrical inner facing consisting of superposed sectional rings provided with outwardly projecting ribs, tension bands engaging said ribs and surrounding said rings at some distance from the body thereof, and a layer of concrete surrounding said inner facing and filling the spaces between said ribs, said tension bands being embedded in said concrete and serving as reinforcing rods therefor.

2. A lining for excavated shafts comprising a cylindrical inner facing consisting of superposed sectional rings provided with outwardly projecting ribs, tension bands engaging said ribs and surrounding said rings at some distance from the body thereof, rods connecting said tension bands, and a layer of concrete surrounding said inner facing and filling the spaces between said ribs, said tension bands and their connecting rods being embedded in said concrete and serving as reinforcing rods therefor.

3. A lining for excavated shafts comprising a cylindrical inner facing consisting of superposed sectional rings provided with outwardly projecting ribs, two sets of ten-

sion bands engaging said ribs and surrounding said rings at different distances from the body thereof, and a layer of concrete surrounding said inner facing and filling the spaces between said ribs, said tension bands being embedded in said concrete and serving as reinforcing rods therefor.

4. A lining for excavated shafts comprising a cylindrical inner facing consisting of superposed sectional rings provided with outwardly projecting ribs, two sets of tension bands engaging said ribs and surrounding said rings at different distances from the body thereof, rods connecting the tension bands of each set, and a layer of concrete surrounding said inner facing and filling the spaces between said ribs, said tension bands and rods being embedded in said concrete and serving as reinforcing rods therefor.

5. A lining for excavated shafts comprising a cylindrical inner facing consisting of superposed sectional rings arranged to break joint and provided with staggered outwardly projecting ribs, tension bands engaging said ribs and surrounding said rings at some distance from the body thereof, and a layer of concrete surrounding said inner facing and filling the spaces between said ribs, said tension bands being embedded in said concrete and serving as reinforcing rods therefor.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

WILHELM BREIL. [L. s.]

Witnesses:

CHAS. J. WRIGHT,
OTTO KÖNIG.