Dec. 22, 1936. E. WIDUGIER 2,065,003

MEANS FOR BUILDING DEEP FOUNDATIONS

Filed Nov. 30, 1934

FIG. 2

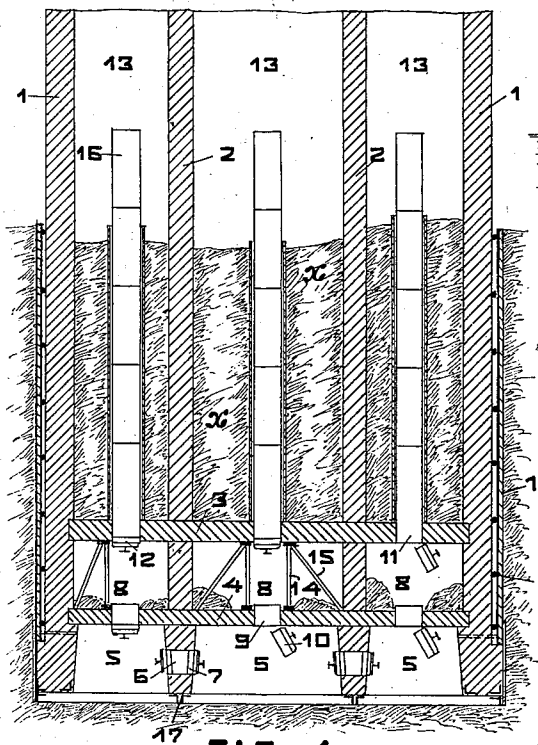


FIG. 3

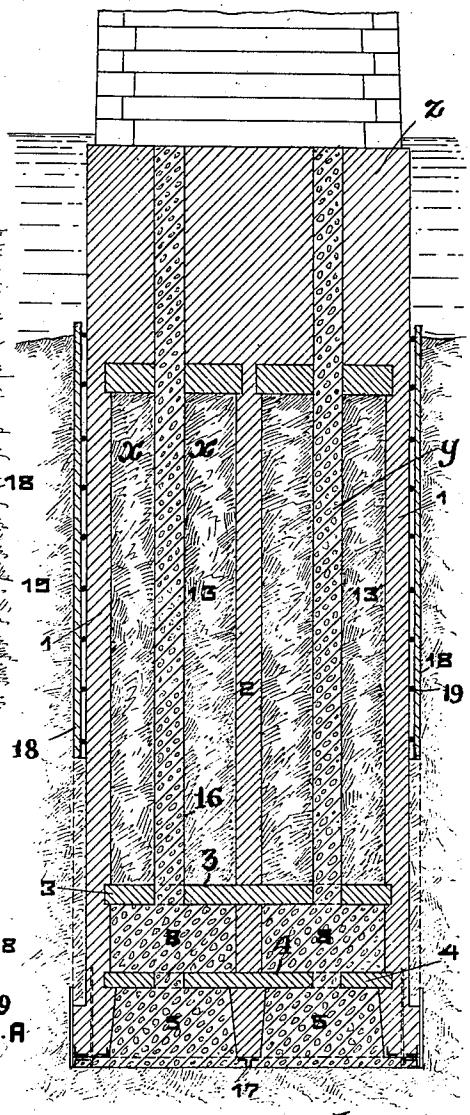
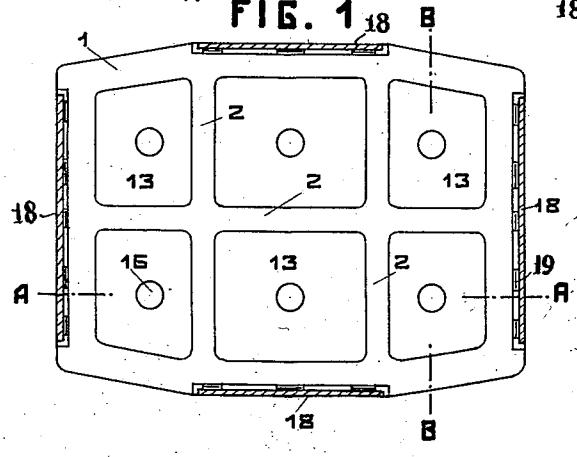


FIG. 1



Inventor
Edward Widugier

By Jn. Fourie

Atty.

Patented Dec. 22, 1936 2,065,003

UNITED STATES PATENT OFFICE

2,065,003

MEANS FOR BUILDING DEEP FOUNDATIONS

Edward Widugier, Torun, Poland

Application November 30, 1934, Serial No. 755,504
In Poland December 11, 1933

4 Claims. (Cl. 61—81)

As is well known, the building of deep foundations by means of caissons is expensive and can be carried out to a certain depth only. On the other hand, when foundations are built by means of well-like excavations, such as shafts, difficulties are encountered in sinking the shafts due to the friction which arises in a high degree between the shaft-walls and the earth, and in the removal of water out of such excavations.

The present invention permits of building all kinds of foundations or subterranean structures at any desired depth and in all ground conditions with economy and technical ease.

The feature of the invention consists of a combination of shaft and caisson, in connection with which an auxiliary facing is used for reducing the resistance between the sides of the casing and the earth.

According to the invention a casing, which later forms part of the foundation under construction and which is divided into working chambers, is sunk into the ground. While the earth is being excavated from under the lowered casing its working chambers are either closed to retain compressed air or opened to admit air at normal pressure.

One way of carrying out the method which is the subject of this invention is illustrated in the accompanying drawing.

Fig. 1 is a top view of the invented means applied to the building of a foundation for a bridge-pier.

Fig. 2 is a vertical section on the line A—A.

Fig. 3 is a vertical section of the caisson in use as a part of the foundation, the line of section being on the line B—B of Fig. 1.

The means, according to the invention, comprises a casing 1, forming part of the foundation under construction. This casing, opened at the top and bottom, is divided into working chambers by the vertical walls 2 and the horizontal decks 3 and 4. Under the deck 4 are working chambers 5, separated from each other by extensions of the walls 2. The walls between the working chambers are provided with man-holes 6 that can be tightly closed by means of the doors 7. Located above each of the working chambers, between the decks 3 and 4, are intermediary chambers 8. Each of the chambers 8 is provided at the top with the opening 11, closed by the cover 12, giving access to the upper chamber 13. All or some of the intermediary chambers 8 have fixed or removable supports 14 and 15 of the decks 3 and 4. The lower edge of the casing and ends of vertical walls taper off towards the bottom and are armoured with the blades 17 which facilitate the sinking of the casing. The upper chambers 13 are provided with the excavating tubes 16 through which excavated material indicated at x is hoisted and workmen enter or leave the casing.

Located outside the casing is a wooden or metal facing 18, comprised of a plurality of separate sections, each of which is independently mounted with respect to the sides of the casing 1. This facing extends wholly or partially along or across the sides of the casing and is separated from them by means of rollers, balls, disks 19, or a layer of fat, grease or the like for reducing friction. During the first stages of excavation the facing is sunk into the ground together with the casing. Later, when the casing is further lowered, the facings remain stationary while the rollers or similar devices, which separate the sides of the casing from the facing, act to reduce friction and facilitate the further sinking of the casing into the ground.

Foundations are built according to the invented method in the following manner:

Casing 1, forming part of the proposed foundation, is for example made to rest on the bottom of a river after having been floated to the designated place.

After workmen have entered the intermediary chambers 8 the covers 12 are tightly closed and compressed air is admitted into the chambers until the pressure in them is equal to that of the working chambers 5. Then, by opening covers 10, the workmen can enter into the working chambers. A part of the working crew remains in the intermediary chambers 8 in order to haul up and accumulate the earth excavated by the workmen in chambers 5. The excavated earth accumulated in chambers 8 is removed through chambers 13. For this purpose a given intermediary chamber is shut off from the working chamber beneath by closing the cover 10, and the compressed air is let out of it. When the air in the given intermediary chamber 8 is brought to atmospheric pressure the cover 12, giving access to the chamber 13, is opened and the excavated earth accumulated in chamber 8 by means of a hoist. The earth removed from chamber 8 can also be left permanently in the chamber 13, thereby replacing concrete or masonry and reducing the weight of the foundation. The upper chambers 13 may however, be filled with concrete or masory, leaving the space under the tubes 16 free for the transportation

of excavated and building material and for the entry and exit of workmen.

After the casing has been sunk into the ground sufficiently below the river bottom work is further carried on in the casing without the aid of compressed air and with the passages between the chambers 5, 8, and 13 left open. Seepage is removed from the chamber 5 by pumps located in chambers 8. When working under such conditions the excavated earth is no longer accumulated in chambers 8, but is hoisted directly out of the working chambers through the openings 9, 11. This manner of attaining the desired foundation level makes the labour connected therewith easier, for, after a certain depth is reached, work can be carried on like in an open shaft at atmospheric pressure.

After the desired depth of excavation has been reached, the casing is utilized as a part of the foundation, concrete indicated at *y* being introduced through the tube 16 to fill the chambers 5 and 8 and the tubes, thus making a more or less solid foundation on which any desired additional foundation or superstructure *z* (Fig. 3) may be supported.

I claim:

1. A means for building deep foundations, comprising a casing open at the top and bottom, vertically ranging partitions in the casing and dividing the same into a plurality of chambers, a lower partition transverse the vertically ranging partitions and providing below the same a plurality of chambers between the vertical partitions, an upper partition transverse the vertically ranging partitions and spaced from the lower partition to provide therewith and with the vertically ranging partitions a plurality of upper chambers, the lower partition being formed with openings to establish passages leading from a lower chamber below such partition to an upper chamber between the lower and upper partitions, and means for sealing any one of said openings at will, whereby any one of the lower chambers may be put under air pressure independently of the pressure in the corresponding upper chamber.

2. A construction as defined in claim 1, wherein the upper partition is formed with openings leading directly to the upper chambers between said upper and lower transverse partitions, and means whereby said openings may be sealed at will.

3. A construction as defined in claim 1, wherein the upper partition is formed with openings leading to the upper chambers, together with excavating tubes extending through the upper chambers from said openings in the upper partition, said tubes permitting the use of material hoists.

4. A construction as defined in claim 1, including a protective sheath fitting the exterior of the walls of the casing, together with anti-friction means arranged between said sheath and casing, providing means to facilitate movement of the casing in the excavation.

EDWARD WIDUGIER.