

(No Model.)

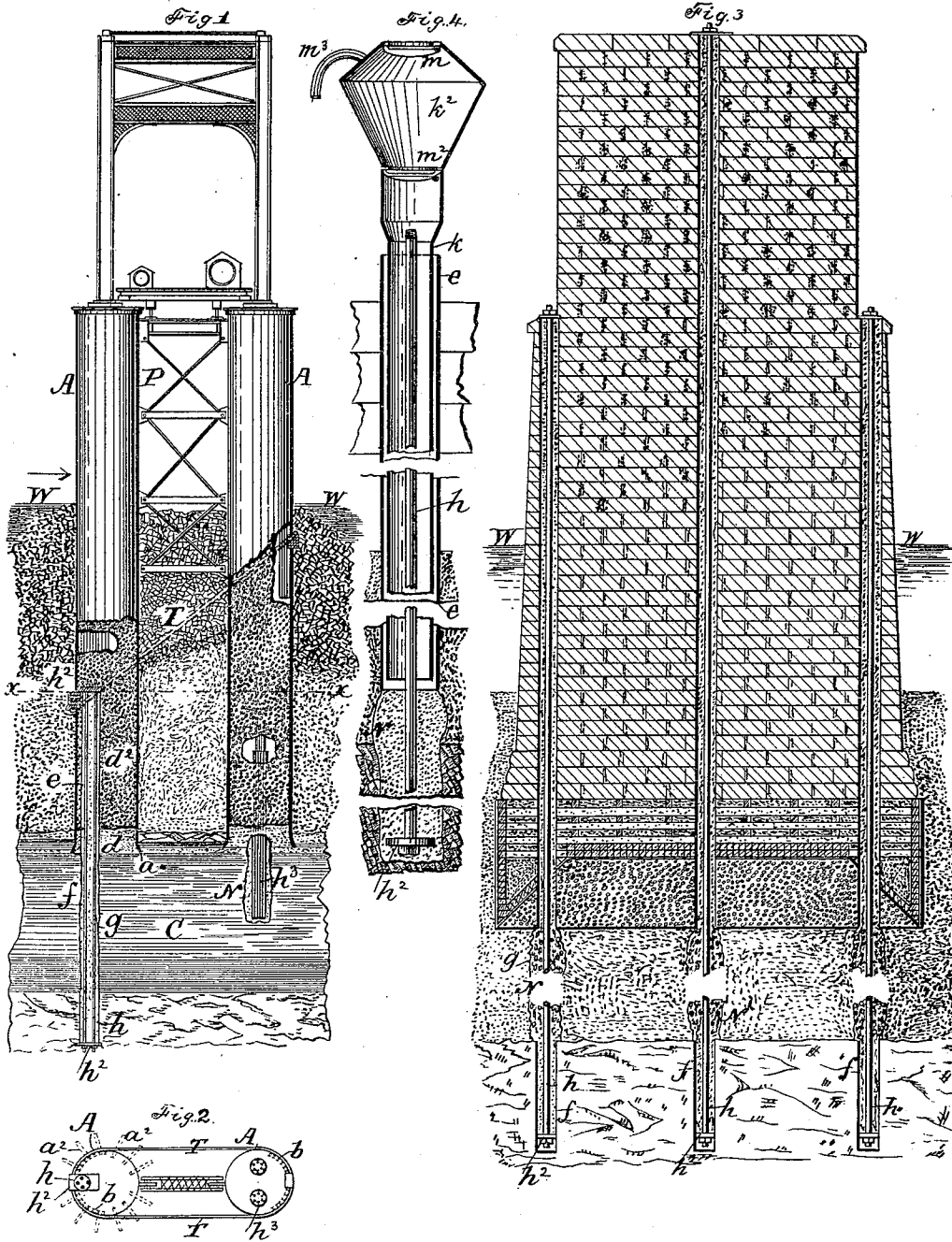
2 Sheets—Sheet 1.

F. E. SICKELS.

METHOD OF AND MEANS FOR BUILDING AND ANCHORING BRIDGE PIERS.

No. 472,277.

Patented Apr. 5, 1892.



Witnesses.

C. C. Schiller

L. C. Hills

Inventor.

Frederick E. Sickels,

by E. E. Masson
his atty

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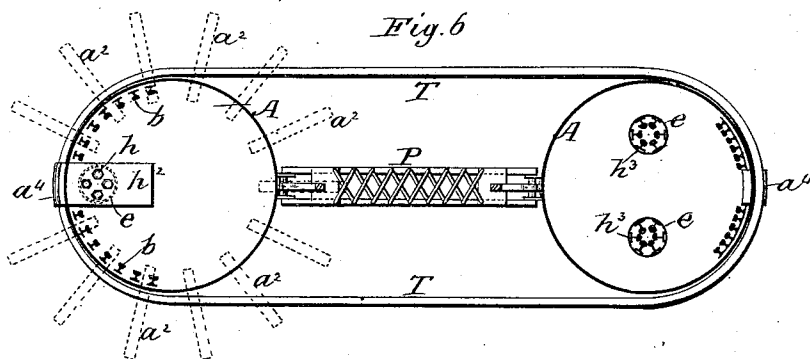
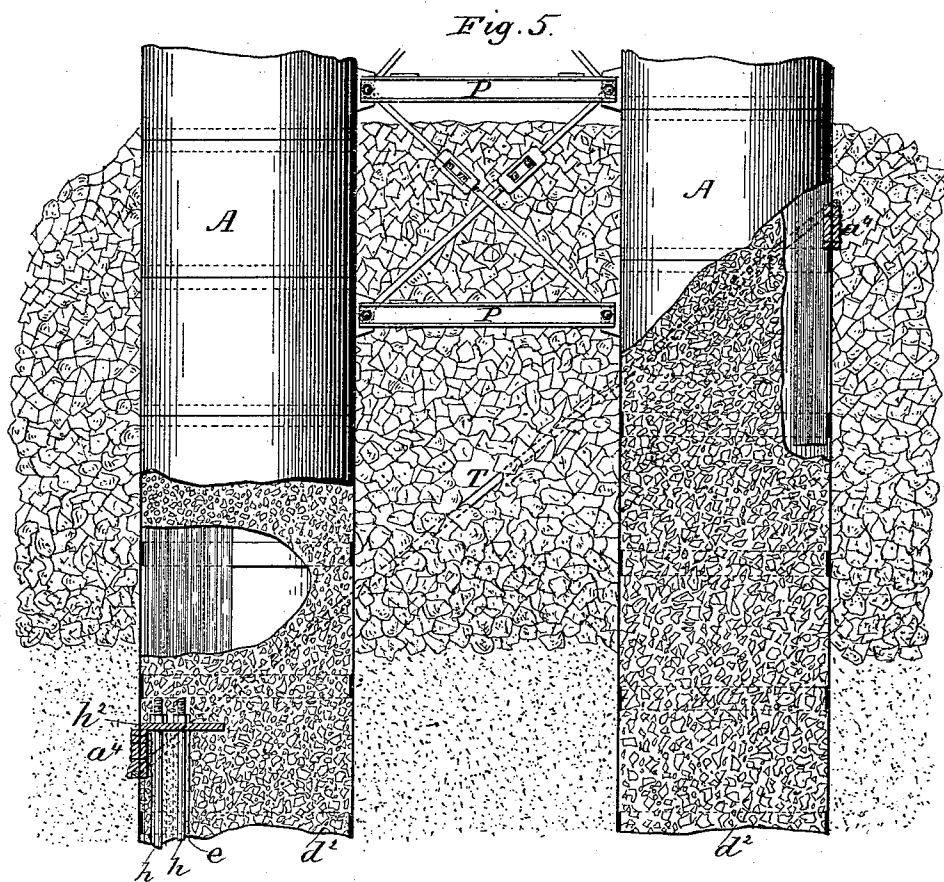
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UNITED STATES PATENT OFFICE.

FREDERICK ELLSWORTH SICKELS, OF KANSAS CITY, MISSOURI.

METHOD OF AND MEANS FOR BUILDING AND ANCHORING BRIDGE-PIERS.

SPECIFICATION forming part of Letters Patent No. 472,277, dated April 5, 1892.

Application filed September 1, 1891. Serial No. 404,417. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK ELLSWORTH SICKELS, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in the Method of and Means for Building and Anchoring Bridge-Piers, of which the following is a specification, reference being had therein to the accompanying drawings.

The object of this invention is to reduce the cost of sinking piers of bridges by limiting the depth thereof (as the cost of sinking them increases rapidly with the depth to which they are sunk) and to obtain the necessary stability of the piers by means of concrete and heavy rods and bars placed within well-holes bored under the piers to any suitable distance, the boring being made in the open air, after the piers have been built to a suitable height, said rods and bars being extended, also, within corresponding vertical openings kept temporarily open in the body of the pier during its construction.

My invention relates to the means used for anchoring bridge-piers after a portion thereof has been built, and it also relates to the means used to fill up the well-holes after the anchoring-rods have been placed therein.

In the accompanying drawings, Figure 1 is a side view, partly in section, of a tubular bridge-pier constructed and anchored in accordance with my invention. Fig. 2 is a top view of the same, partly in section, on line *xx* of Fig. 1. Fig. 3 is a vertical section of a stone pier constructed and anchored in accordance with my invention. Fig. 4 represents a vertical section of a portion of a well-hole of the bridge-pier, having an anchoring-rod therein, with the tubes and hopper used in filling the well-hole with concrete or other adhesive material. Fig. 5 is a side view, partly in section, of a portion of the tubular bridge-pier shown in Fig. 1, but on a larger scale to clearly show the heavy encircling tie *T* and its connection with the pier-cylinders *A* by means of the abutting plates *a*¹, riveted to said cylinders, and the anchorage-rods *h*, through the medium of the horizontal plate *h*². Fig. 6 is a top view of the same or an enlarged view of Fig. 2.

In said drawings, *A* represents cylinders of

metal sheets of suitable size riveted together. Said cylinders may be eight feet in diameter, more or less, and at suitable distances apart to form a bridge-pier. To construct said bridge-pier, a coffer-dam may first be built to inclose the location selected for the bridge-pier, and then the lower portion of each cylinder *A* is first brought and made to stand in its projected position, its lower edge resting upon a compact and resisting stratum, as compact clay, (shown at *C*), but preferably upon a stratum of stone, if it is of sufficient thickness. The walls of the cylinders can be used as coffer-dams to sink them to a proper depth in a well-known manner by excavating in the interior. The lower edge of the cylinders *A* can be made flaring, as at *a*, to enlarge their base and form an anchor in the surrounding stratum, and a series of planks *a*² can be driven at an angle of about forty-five degrees under said edge to enlarge the supporting-base of the cylinders. To properly support the sheet metal of the cylinders against floating logs or ice, a series of heavy iron bars (as railroad-rails) *b* are placed vertically against the inner surface of the cylinders, and the latter are nearly ready to be filled with cement *d* at the bottom and then concrete *d*²; but before filling said cylinders one or more sheet-metal pipes *e* are retained vertically within the cylinders *A* over the positions in which it is intended to have wells *f* bored and anchors *g* planted. Said wells and anchors under the base of the piers constituting the main parts of my invention can at little expense be extended fifty or a hundred feet and end into a stone or other reliable stratum.

The pipes *e* are about eight or ten inches or more in diameter and can be left to remain within the cement *d* and concrete *d*² poured and packed within the cylinders *A*; but they are preferably lifted gradually therefrom as soon as the cement has become partly set, so that the concrete used afterward to fill the wells will firmly adhere to the walls thereof. After the cylinders *A* have been built and filled (except the well-holes therein) to a suitable height above the bottom of the coffer-dam, if the latter is used, or preferably above the level *W* of the water in the river, suitable well-boring mechanism can be used at little expense and operated in the open air to bore

the wells *f* under the pier, the boring-tool being first inserted in the pipes *e* or in the well-holes left by the latter in the concrete and cement filling of the cylinders A. After the wells *f* have been bored rods *h* are lowered to the bottom of said wells. Four of such rods are preferably used and have their lower ends secured to a circular plate *h*², having substantially the same diameter as the bore of the well and serving as an anchoring device for said rods. In place of the rods *h* and their plate *h*² a bunch of railroad-rails *h*³ may be used for the same purpose and be extended by means of fish-plates. After the rods *h* or rails *h*³ have been placed within the wells the latter are filled with cement or fine concrete that is made to fall through the air in the wells. To facilitate the filling, a suitable length of the pipe *e* is retained in the upper end of the well, as shown in Fig. 4, and within the latter is placed a pipe *k* of substantially the same length as the pipe *e*, of slightly smaller diameter, to direct the concrete to the bottom of said pipe *e*. On top of the pipe *k* there is a hopper or air-lock *k*², having a hinged upper door *m* and a hinged lower door *m*². The upper door is opened to admit the concrete into the lock, and after sufficient concrete has been received the upper door is closed and air is forced into the lock through the pipe *m*³ and suitable apparatus. The lower door is then opened and the concrete in the lock is allowed to drop to the bottom of the pipe *k*. By maintaining a pressure of air in the pipe *k* sufficient to force all water out of it the concrete in falling will pass only through air. If there is any water in the well-hole, it will be forced up between the pipe *k* and the outer pipe *e* and escape over the edge of the latter. While filling the well-holes with concrete both pipes can be lifted together, as by mak-

ing the pipes of equal length the relative position of the air-lock will be preserved.

While boring the well-holes through strata of material liable to caving in, casing-pipes as *e* must be used, and when said pipes are withdrawn while the concrete is dumped in, the latter will extend outside of the periphery of the pipes, as shown at N in Figs. 1, 3, and 4, and form an anchorage in the stratum.

In Figs. 1, 2, 5, and 6 the pier-cylinders A are shown connected together by horizontal and diagonal braces P, placed between them. They are also encircled by a heavy tie T, that transmits the strain of the water-current against the upper portion of the cylinders of the bridge-pier to the anchoring-rods *h*, which are bolted to a horizontal plate *h*², one end of which extends upon a portion of the tie T. Substantially the same kind of boring wells and anchorage is shown under the stone pier represented in Fig. 3.

Having now fully described my invention, I claim—

1. An anchorage for bridge-piers, which consists of rods placed within wells extended both under and within the pier and concrete packed around the rods and bars in said wells, substantially as described.

2. In combination with bridge-piers consisting of cylinders A, having concrete filling, anchoring-rods placed within wells extended both within and under the piers, and concrete packed around said rods, with the tie T encircling the cylinders A and having engagement with the anchoring-rods, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

FREDERICK ELLSWORTH SICKELS.

Witnesses:

LEE RILEY,
BRUCE DODSON.