No. 758,656. PATENTED MAY 3, 1904.

G. W. JACKSON & C. HOGAN.

PILE.

APPLICATION FILED JAN. 16, 1901.

NO MODEL.

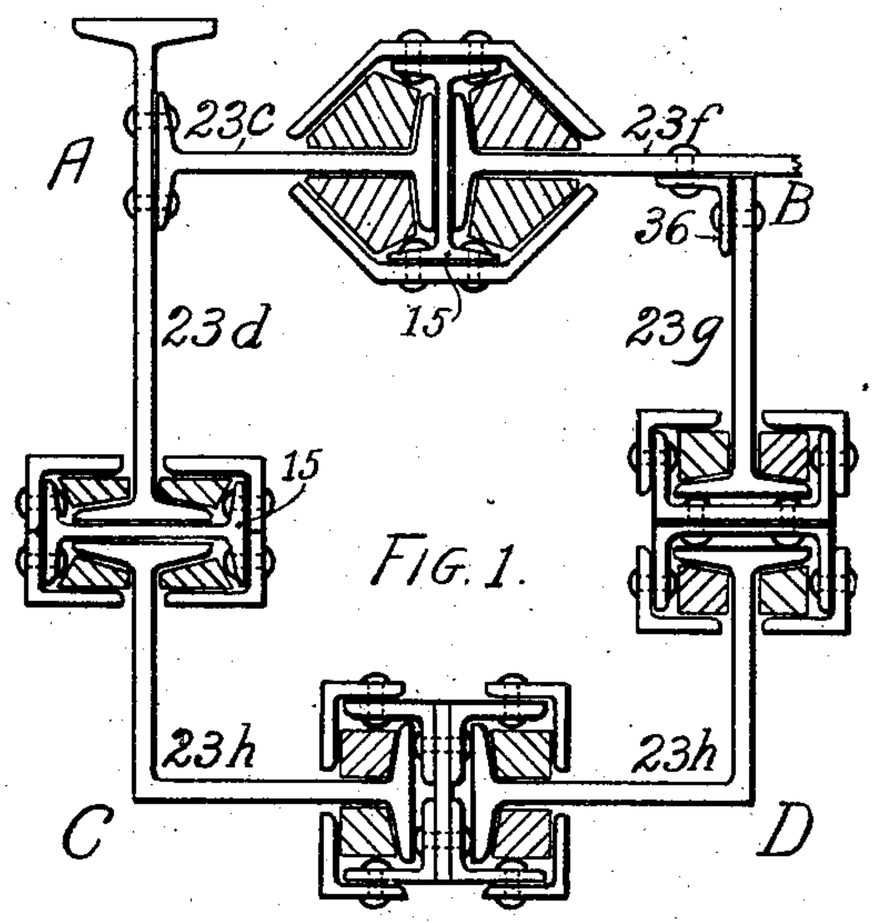


FIG. 1.

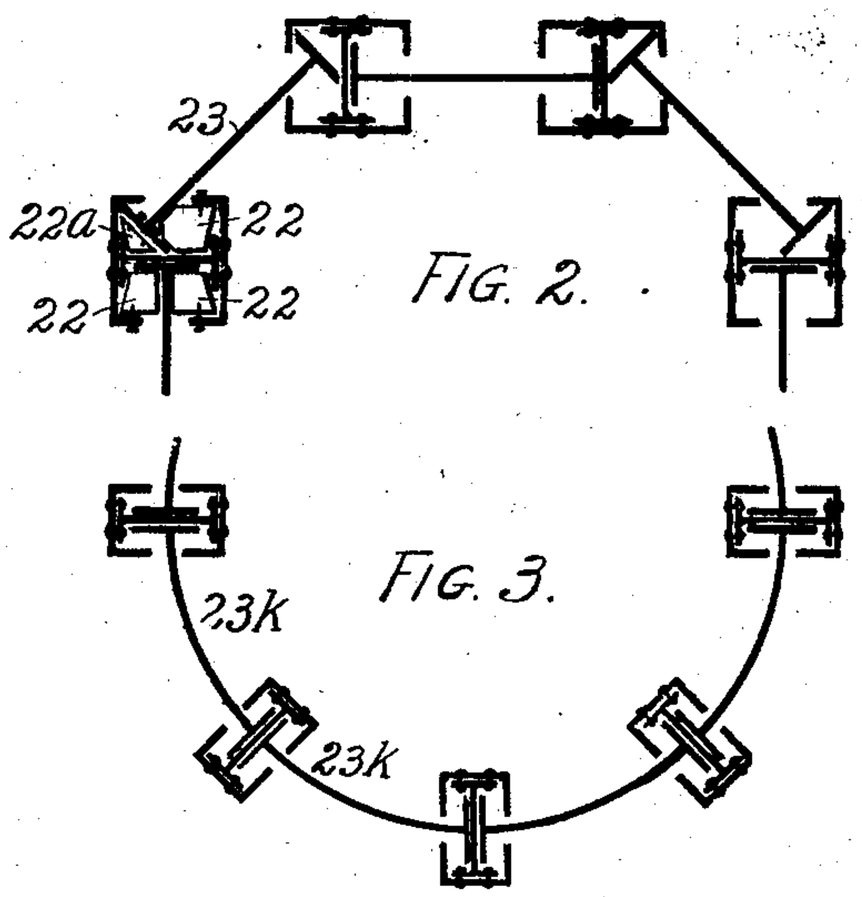


FIG. 2.

FIG. 3.

FIG. 4.

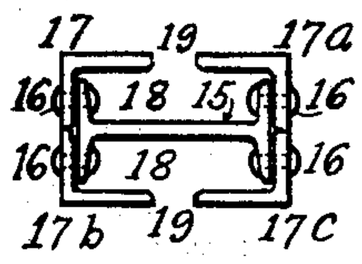
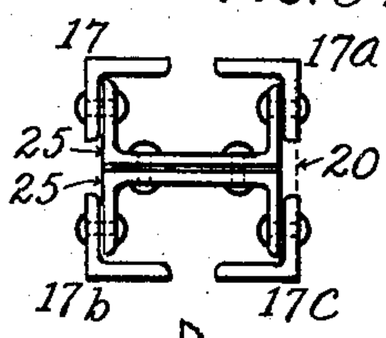


FIG. 5.



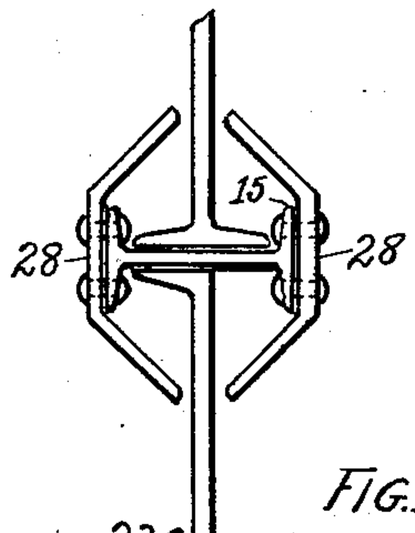


FIG. 11.

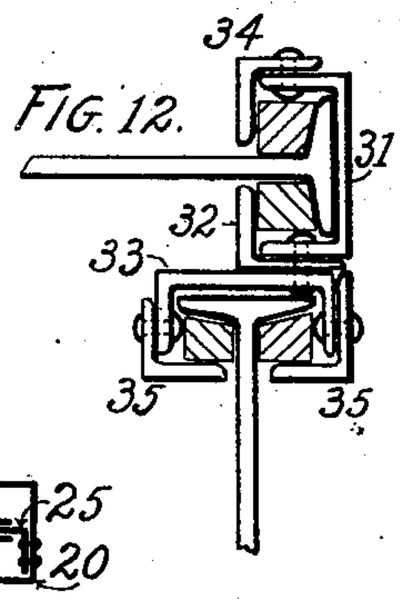


FIG. 12.

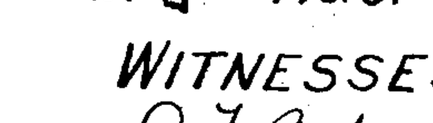


FIG. 6.

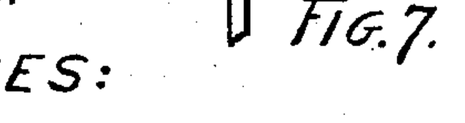


FIG. 7.

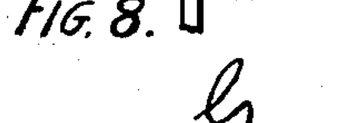


FIG. 8.

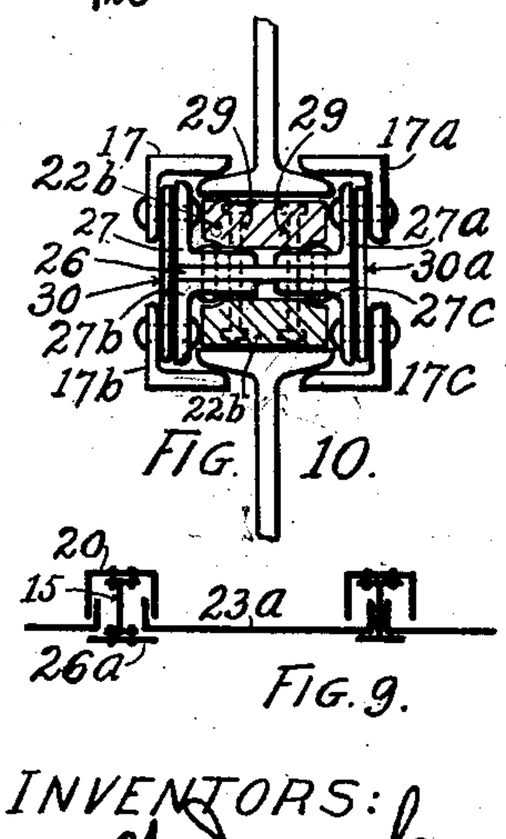


FIG. 10.

FIG. 9.

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UNITED STATES PATENT OFFICE.

GEORGE W. JACKSON AND CORNELIUS HOGAN, OF CHICAGO, ILLINOIS.

PILE.

SPECIFICATION forming part of Letters Patent No. 758,656, dated May 3, 1904.

Application filed January 16, 1901. Serial No. 43,507. (No model.)

To all whom it may concern:

Be it known that we, GEORGE W. JACKSON and CORNELIUS HOGAN, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Piles, of which the following is a specification.

Our invention relates to improvements in piles, beams, or girders adapted for building dams, sinking shafts, or for any structure whatsoever in which beams or girders may be employed; and the objects of our invention are, first, to provide a metallic beam which while of a special form when completed is made up entirely of standard shapes of the metal or metals entering into its construction; second, to provide means whereby the said metallic beam when used in combination with suitable connecting means for connecting together a series of such beams, as in the construction of coffer-dams or the like, may be made absolutely waterproof, and, third, to provide a beam which after having served, say, as a pile may either be again used for the same purpose elsewhere or for any other purpose where beams or girders may be employed, as in the construction of a building, bridge, or the like, and the beam may be so used either as a whole or taken apart and the various parts used to the best advantage in different places. We attain these objects by the means illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of a square shaft or column, showing our improved beam constructed in four different ways, the details of which are shown in Figs. 4 to 8, also three different methods of making right-angle corners by means of the connecting-irons. Fig. 2 is a similar view of the parts arranged for an octagonal shaft or pile. Fig. 3 is a similar view showing how round or circular shafts may be made. Figs. 4 and 5 show two different forms of our beam before the fillers or guides have been attached thereto or the connecting-irons inserted. Figs. 6 and 7 show in their upper parts the beam with the connecting-irons inserted therein and in their lower parts the beam with the fillers or guides and the connecting-irons inserted. Fig. 8 shows how our beam may be formed of three **I**-beams or of one **I**-beam and two "trough-channels." It also shows that either "**I**," "**Z**," or "channel" irons may be used for connectors. Fig. 9 shows in the left-hand part a beam constructed of an **I**, a channel, and a flat piece of iron. In the right-hand part the beam consists simply of an **I** and a channel iron. Fig. 10 is a plan view of still another form of the beam. It also shows the flanges of the connecting-irons fitted against the outer flanges of the beam instead of against the center part, using one filler per channel instead of two. In Fig. 11 the beam is made up of three channel-irons. Fig. 12 is a plan view of a special form adapted for corner-posts of angular shafts or piles.

Similar characters refer to similar parts throughout the several figures.

Referring to Figs. 1 and 4, the center or supporting structure 15 consists of an **I**-beam to the flanges of which are attached (preferably by means of rivets 16 16, &c.) the angle-irons 17 17^a 17^b 17^c, so that the free flanges of 17 and 17^a, as also those of 17^b and 17^c, project toward but do not touch each other, thus forming two channels 18 18 and two slots 19 19 longitudinally of said supporting structure 15 and on opposite sides thereof. Instead of using four angle-irons 17 17^a 17^b 17^c, as here shown, we may use two channel-irons 20 20, Fig. 6, or two **I**-beams 21 21, Fig. 8, or any other shape or form having the necessary flanges to form the channels and slots, or a combination of different shapes may be used, as will be readily seen by examining the various figures and as may be deemed most advantageous for any particular case in hand. This applies to either form of beam shown. Within the channels 18 18 are then placed the fillers 22 22 22 22, which also act as guides for the insertion of the connectors 23 23. We preferably make these fillers of wood, and for the construction of dams or shafts in deep water or other places where great strength is required we preferably bolt them to the flanges of the beams by means of lag-screws 24 24, &c., Fig. 6. Any other suitable material or

method of attaching the same may, however, be used as may seem most advantageous in any particular case without departing from the spirit of this invention. For example, in Fig. 2 three of the fillers 22 22 22 are shown attached to the flanges of the beam, while filler 22^a is attached to the connector 23. Again, in Fig. 10 but two fillers 22^b 22^b are used, and they are attached to the center or dividing structure of the beam by means of bolts 29 29, (shown by dotted lines,) passing through both of the fillers and the said dividing structure of the beam. The heads and nuts of these bolts are countersunk into the fillers, so as to leave smooth surfaces bearing against the metal parts of the beams and the connectors. This latter construction is suitable for work where the greatest strength is not required, and it possesses the advantage of economizing material, as the distance between every two beams may be increased by as much as the thickness of the two fillers.

The method of fastening the fillers 22 22 may be similar with either form of beam shown. When the beam is used as a pile, the fillers must necessarily be employed in order to secure a waterproof construction. Hence what has been said above in reference to the fillers will apply to all forms of the beam. When the beam is to be used for purposes or in places where a waterproof construction is not required, the fillers may be omitted.

The beam shown in Fig. 5 is made by riveting together the webs of two channel-irons 25 25, so as to form an **I**-shaped beam, to the flanges of which are then attached the angle-irons 17 17^a 17^b 17^c or channel-irons 20, as indicated by a dotted-line connection between the angle-irons 17^a and 17^c. It is also practicable to use for the supporting structure but one channel-iron instead of two, the flanged transverse structures (channel-irons 20 or the equivalent thereof) being attached to the flanges of the supporting structure, as described. This is illustrated by Fig. 11.

In Fig. 7 is shown a beam similar to that in Fig. 5, except that the dividing structure of the one in Fig. 7 is composed of a flat piece of metal 26, to each side of which are riveted two angle-irons 27 27 27 27, with their free flanges projecting outward, so as to form an **I**-shaped structure.

In the upper part of Fig. 8 is shown a beam the dividing structure 15 of which is an **I**-beam, as in Figs. 4 and 6. To this **I**-beam are attached trough-channels 28 28 instead of the right-angular flange-pieces, as in previously-described figures.

The middle and lower parts of Fig. 8 show our beam constructed of **I**-beams only, one of which is used for the supporting structure 15, while of the other two, 21 21, one is attached to each of the flanged sides of the supporting structure. Instead of using **I**-irons for connectors between the beams we may use other suitable shapes, as here shown, where the upper and middle beams are connected together by means of a channel-iron 23^a, while the middle and lower beams are connected by a **Z**-shaped connector 23^b.

In the left-hand part of Fig. 9 the dividing structure 15 is an **I**-beam, or the equivalent thereof, to one of the flanged sides of which is attached a flat iron piece 26^a and to the opposite side a channel-iron 20, the flanges of which project toward the flat piece 26^a, thus forming the slotted channels with the slots extending along one of the corners of each channel instead of at or near the center, as in previously-described figures. In the right-hand part of Fig. 9 the construction is simplified still further by leaving off the flat piece 26^a.

The supporting structure of the beam shown in Fig. 10 is similar to that in Fig. 7, being composed of a center blade 26, to which the angle-irons 27 27^a 27^b 27^c are attached, so as to form an **I**-shaped structure. The angle-irons 17, &c., are not, however, attached directly to the free flanges of the angle-irons 27, &c., as in Fig. 7, but the blades 30 30^a, similar to the blade 26, are interposed, one blade, 30, between the angle-irons 27 and 17 and 27^b and 17^b and the other blade, 30^a, between 27^a and 17^a and 27^c and 17^c. This structure possesses greater strength than the one shown in Fig. 7.

The form shown in Fig. 11 has been described in connection with Fig. 5.

In Fig. 12 is shown a form of our beam especially adapted for corner-posts of a dam or pile. Here one flange of each (the channel-iron 31 and angle-iron 32) are riveted to the web of channel-iron 33. Another angle-iron, 34, is riveted to the free flange of channel-iron 31, with its free flange projecting toward that of the angle-iron 32, thus completing one of the slotted channels. The other slotted channel is completed by the angle-irons 35 35 being riveted to the flanges of channel-iron 33, and when so completed the two channels are at right angles the one to the other.

If a trough-channel 28, Fig. 8, be used instead of the right-angular channel-iron 31, then the slotted channels will be at an angle the one to the other corresponding to the angle of the flanges of the trough-channel. Thus if the flanges of the trough-channel be at an angle of forty-five degrees then the slotted channels will also be at an angle to one another of forty-five degrees, and the beams so made may be used for the construction of octagonal dams or shafts instead of the plan shown in Fig. 2.

The corners shown in Fig. 1 are constructed as follows: Corner A is made by riveting the flanges of connector 23^c to the web of connector 23^d. At B the connectors 23^f and 23^g are riveted to an angle-iron 36. Corners C and D are alike and are made by using one-half of what is known as a "Larimer" column—

i. e., an **I**-beam the web of which is bent to right angles, as a connector 23^h—instead of the usual **I** or **T** beams, as at A and B.

In Fig. 3 the webs of the connectors 23^k are curved, so as to give the required curvature of the dam, pile, or shaft. In this figure, as well as in Fig. 2, the construction of all the beams shown is similar to that given in detail in Figs. 4 and 6. It is self-evident, however, that the forms shown in the other figures may be used equally as well.

The construction of a shaft, coffer-dam, or the like by means of this invention is preferably done in the following manner: A beam with the fillers attached is first driven down at any desired point in the line of one of the walls of the dam or shaft. Then the flanges of a connector 23, Fig. 6, are inserted in the space left between the fillers 22, Fig. 6, 22^b, Fig. 10, and the walls of the slotted channel, the web of the connector extending through the slot in that channel, and the connector is driven down, the fillers now acting as guides for the connector to hold it in place while being driven. Next, another beam is fitted over the free flanges of the connector, the flanges passing into the space between the walls of the channel and the fillers, the web or stem extending through the slot to the first beam. The second beam is then driven down, the fillers again maintaining perfect alinement of the beam and connector. The two beams are thus securely locked together by the connector, as shown in the drawings. This operation is repeated until a structure of the desired size has been built, the beams and connectors alternating throughout the structure.

The fastening together of the various iron pieces is preferably done by means of rivets; but any other means—such as screw-bolts, for instance—may be employed without departing from the scope of this invention.

The material used in the construction of either form of beam and also the connectors except 23^k, Fig. 3, are standard shapes, which may be bought in the open market, thus reducing the first cost to a minimum. The choice of form will depend upon the purposes for which the beam is to be used. Thus when used for piles to sink shafts for the construction of a foundation for a structure in the further completion of which **I**-beams will be principally employed, then the beam shown in the middle and lower parts of Fig. 8, together with **I**-shaped connectors, will be found most economical. On the other hand, should the nature of the superstructure be such as to require mostly channel or angle irons then the beam shown in Figs. 5 and 7, respectively, may best be used.

It often happens in driving piles that submerged logs or other obstructions are encountered which very seriously interfere with the driving of wooden piles. In such cases we may sharpen the lower ends of the connecting-irons or of the beams, or of both, as may be necessary, and cut through the logs or other obstructions without much difficulty. It is also evident that it is much easier to maintain proper alinement with this invention than with wooden piles, especially in difficult places, where with the latter this is at times almost impossible; yet perfect alinement is indispensable for the construction of a good safe dam, especially in comparatively deep water.

Where the lower strata of ground are of themselves practically impenetrable to water, the fillers need to be used only in that part of the beams passing through the water or porous ground and extending far enough into the dense stratum to insure a sufficiently waterproof construction. Thus where the density of the ground ordinarily makes the driving of piles slow and hard work the body of our beam is reduced to narrow cutting edges, and it can therefore be driven with great ease. The same is true of the connectors, as they also displace but a small quantity of earth.

Wherever in this specification or in the claims the word "structure" is used to designate a part of the beam, it denotes either a solid one-piece structure—such as an **I** or channel iron, for instance—or a built-up structure composed of a plurality of pieces combined so as to give the desired form.

The words "center piece" or "center structure" as used in this specification and the claims denote a structure interposed anywhere between the outer walls of the beam, whether forming a part of said outer walls or not, and although the said center piece or center structure is preferably located at or near the center of the beam, as shown in the drawings, we do not wish to limit ourselves to this particular location thereof.

We claim—

1. In a device of the character described, the combination with a column comprising a central plate having outwardly-extending flanges along the edges thereof and outer plates secured upon said flanges by rivets passing through said outer plates and the flanges of said central plate, said outer plate having flanges which extend over the central plate and toward one another, of means for securing two or more columns together.

2. In a device of the character described, the combination with a column comprising a central member composed of two parts each having outwardly-extending flanges and which are secured together by a plurality of rivets, and outer plates secured to said flanges in a suitable manner, said outer plates having flanges which extend toward one another and over the central member, of means for securing two or more of said columns together.

3. In a device of the character described, the combination with a column comprising a central plate provided at its edges with flanges

and outer plates secured to the flanges of said central plate by rivets, said outer plates having flanges at the edges thereof which extend toward one another and over the central plate, of means for securing two or more of said columns together.

4. In a device of the character described, the combination with a column comprising a central member composed of two plates riveted together and each having outwardly-extending flanges at its edges, the flanges at the corresponding edges of said plates being arranged substantially in alinement and outer plates secured to the said flanges at each side of said central member and each having flanges at their edges which extend toward the corresponding flange of the outer plate and over the central member of an **I**-beam for securing two or more of said columns together.

5. A beam comprising a web structure and angle-irons attached thereto so as to form, longitudinally of the said beam, slotted channels adapted to receive connecting means for connecting together two or more of the said beams, the parts forming the said web structure being secured to one another, substantially as described.

6. In combination, the beam having a dividing structure and slotted channels at an angle the one to the other extending longitudinally thereof, and connecting means adapted to pass through the said slots and extending from beam to beam to join the said beams together at an angle the one to the other, substantially as described.

7. In combination, the beam having slotted channels extending longitudinally thereof, connecting means adapted to pass through the said slots and extending from beam to beam to connect together two or more of the said beams, and wooden fillers within the said slotted channels, substantially as described.

8. In combination, the beam having a slotted channel in each of several different sides thereof facing at different angles, connecting means adapted to pass through the said slots and extending from beam to beam to connect the one beam to the other, and means within the said channels and adapted to be attached to one of the walls thereof to make waterproof the joint between the said beam and the said connecting means, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

GEORGE W. JACKSON.
CORNELIUS HOGAN.

Witnesses:
Mrs. E. B. JUDD,
A. H. GEHLE.