J. E. WILHELM & W. W. BONFIELD.

PILE SAWING DEVICE.

APPLICATION FILED APR. 7, 1916.

1,221,401.

Patented Apr. 3, 1917.

3 SHEETS—SHEET 1.

FIG 1

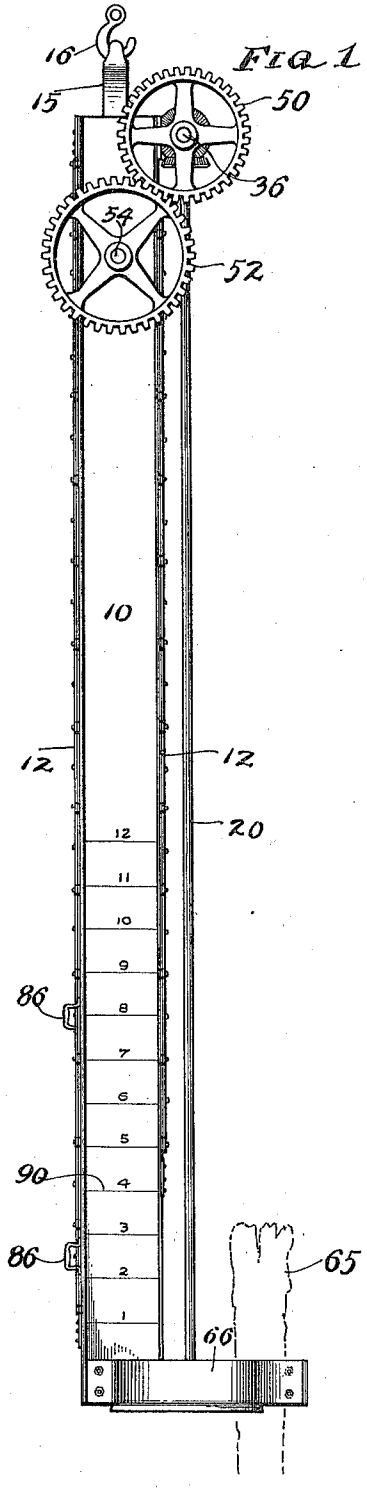
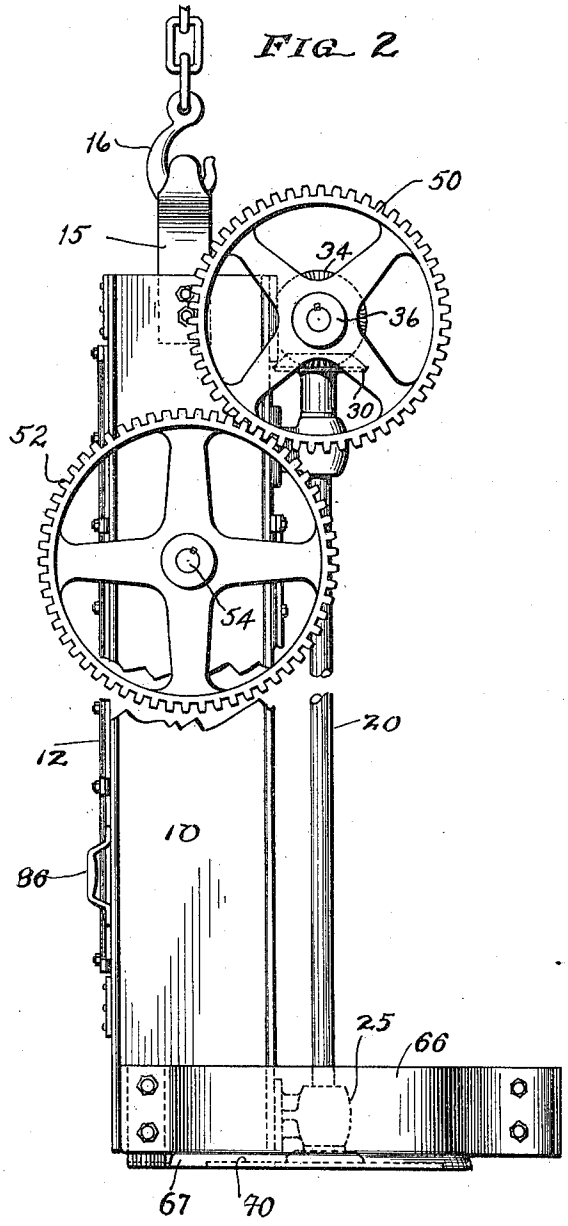


FIG 2



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3 SHEETS—SHEET 2.

FIG. 3

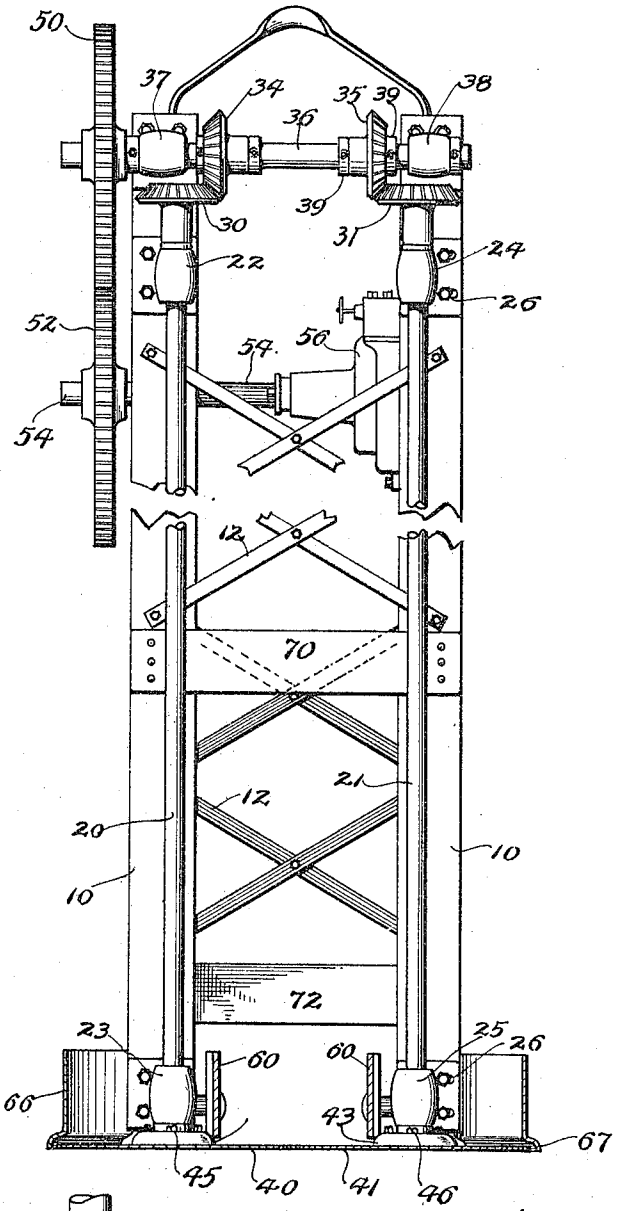
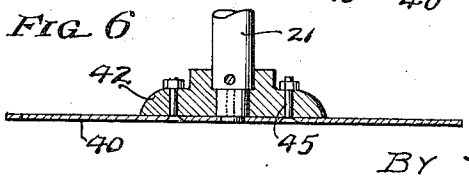


FIG. 6



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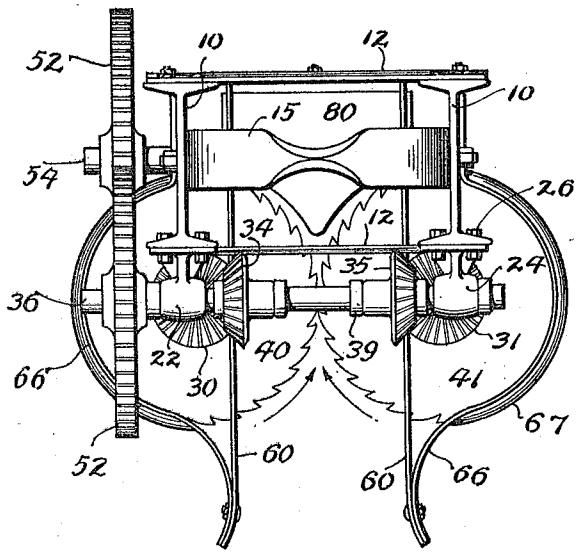
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3 SHEETS—SHEET 3.

FIG 4



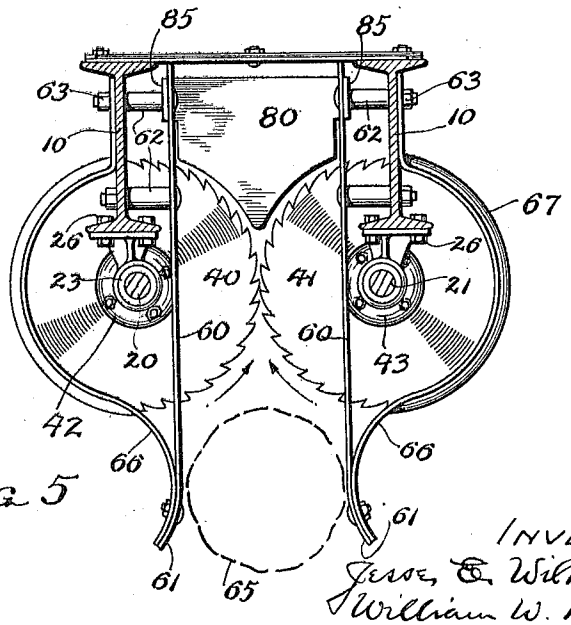


FIG 5

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UNITED STATES PATENT OFFICE.

JESSE E. WILHELM AND WILLIAM W. BONFIELD, OF CLEVELAND, OHIO, ASSIGNORS TO THE GREAT LAKES DREDGE & DOCK COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF NEW JERSEY.

PILE-SAWING DEVICE.

1,221,401. Specification of Letters Patent. Patented Apr. 3, 1917.

Application filed April 7, 1916. Serial No. 89,671.

To all whom it may concern:

Be it known that we, JESSE E. WILHELM and WILLIAM W. BONFIELD, citizens of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Pile-Sawing Devices, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The general object of this invention is to provide a simple efficient rapidly operating device for sawing off piles, posts and the like after they have been driven into position, the device being particularly well adapted for severing such piles below the surface of the water.

It has heretofore been the practice to cut off piles with a single saw mounted on a vertical shaft carried in rigid supports mounted on a suitable vehicle, the saw being fed into the pile by moving the entire vehicle. Thus where the only, or most convenient, access is by water it is customary to mount such a saw and upright shaft on a floating barge or boat and feed the saw through the pile by drawing the entire craft toward the pile. Such an operation is not only laborious and comparatively slow, but if the water is at all rough there is great liability of waves rocking the craft carrying the saw, after it has engaged the pile, resulting in breaking the saw. A further object of our invention is to obviate this difficulty which we accomplish by so arranging the sawing device that it may be conveniently carried by a crane or suspended by any such means by which it may be lowered to the right height and readily fed into the pile by swinging the device.

The crane carrying our device may be mounted on a vehicle on land or on a suitable barge or boat in the water, and it will be seen that where the upper ends of a number of adjacent piles are to be cut off, the device may be quickly shifted from one to the other by operating the crane. In case the crane is carried by a floating craft, the danger of breaking the saw, in the manner above described, is almost entirely obviated by reason of the portion of the crane carrying the sawing device being adapted to compensate for a rocking movement of the craft relieving the lateral strain on the saws while cutting the pile.

In carrying out our invention we provide two coöperating saws tending to feed themselves quickly into the pile and so positioned as to render unnecessary rigid guides such as are commonly used where a single saw is employed.

More specific objects are cheapness of manufacture and durability of the device. Other objects and advantages will become apparent in the following description which refers to the drawings.

Referring to the drawings, Figure 1 is a side elevation of our pile sawing device; Fig. 2 is a side elevation with the intermediate portion broken out showing the parts on a larger scale; Fig. 3 is a front elevation on substantially the same scale as Fig. 2 with the intermediate portion broken out and some of the parts at the lower end being sectioned for clearness; Fig. 4 is a top plan; Fig. 5 is a horizontal section through the lower end of the device above the saws; and Fig. 6 is a sectional detail through one of the saws and the lower end of the shaft.

In the drawings, the reference numerals 10, 10 indicate two longitudinal I-beams preferably parallel and securely braced by each other in their separated positions by cross members 12 of any suitable construction. These I-beams and bracing members comprise the frame of our sawing device which is adapted to operate in an upright position and be suspended from a suitable crane or any like device by an upwardly extending bail 15 secured to the webs of the I-beams at their upper ends and adapted to be engaged by a suitable hook 16 or other supporting device.

Carried at one side of each of the I-beams are two normally vertical shafts 20 and 21 parallel with the I-beams and secured thereto by suitable bearing-brackets 22 and 23, and 24 and 25, at the upper and lower ends of the shafts 20 and 21 respectively. These bearing-brackets preferably have flat portions engaging the adjacent flanges of the I-beams and secured thereto by suitable bolts indicated at 26. Above the bearings 22 and 24 are provided bevel-gears 30 and 31 respectively, rigidly mounted on the shafts and shown as resting against outwardly extending flanges of bearing-liners carried in the bearings 22 and 24. These gears are adapted to be driven in opposite directions by coöperating bevel-gears 34 and

35 rigidly mounted on a transverse shaft 36, carried in bearings 37 and 38, also secured to the adjacent flanges of the I-beams.

At the lower ends of the shafts 20 and 21, below the bearings 23 and 25 are mounted two coöperating saws 40 and 41. These saws are preferably secured to collars 42 and 43, rigid with the shafts, by bolts 45 and 46 having their heads countersunk into the saws so that there may be no projections beneath the plane of the saws. These saws preferably extend beneath the lower ends of the I-beams 10 which permits positioning the shafts close to the I-beams, and it will be seen that when the shaft 36 is rotated the gears 34 and 35 will drive the coacting gears 30 and 31 in opposite directions correspondingly rotating the shafts and driving the saws in opposite directions of rotation. Thus when the saws are rotated in the direction of the arrows in Figs. 4 and 5, their adjacent edges move toward the frame tending to draw the frame toward the pile engaged, thus feeding themselves into the pile.

The shafts, described, may be driven by any suitable means; for example, we have shown on one end of the shaft 36 at the outer side of the adjacent I-beam, a gear 50 rigid with this shaft and adapted to be driven by a coöperating gear 52 rigid on a shaft 54, shown as extending through the web of the adjacent I-beam and forming the driving shaft of a rotary engine 56 carried by the opposite I-beam 10. While the engine 56 may be of any suitable construction it is desirable to use a rotary engine owing to its compactness and the convenience of securing the same in position.

At the lower end of the I-beam members, we have provided vertical guide plates 60, shown as secured to the webs of the I-beams and spaced therefrom by distance collars 62 through which extend suitable bolts 63. These guide plates extend forwardly just above the saws and are substantially parallel for the greater portion of their length, but their outer ends are flared outwardly as at 61, serving to conveniently guide the saws to the pile, indicated in broken lines at 65 in Figs. 1 and 5. Secured to the outwardly projecting portions of the guide plates 60 are plates 66 having their intermediate portions curved outwardly around the saws and then inwardly and secured to the webs of the I-beams. These plates preferably have outwardly projecting flanges 67 providing arcual recesses into which the peripheries of the saws extend, and which serve to guard the teeth of the saws. The plates 60 and 66 may be of any suitable height, (preferably extending for about a foot or more above the saws).

It will be noted in Figs. 1 and 3 that on the forward side of the I-beams, that is the side toward the saws and shafts, the cross bracing 12 is discontinued some distance above the saws, and below this bracing is preferably a wide transverse bar 70 secured to the flanges of the I-beams and positioned several feet above the saws. A similar member 72, positioned adjacent to the lower ends of the I-beams, is secured to the rear flanges thereof. In practice it is usually necessary to sever only the ragged or uneven upper ends of the piles, thus from a few inches to two or three feet is usually the amount cut off, and it will be seen that in passing the saws through the pile, the severed part of the pile above the saws may stand between the forward edges of the I-beams and below the cross bar 70. To prevent accident to the saws from the severed portion dropping between the saws and the rear of the frame, we have provided a substantially horizontal plate 80, mounted in the plane of the saws and having a portion extending forwardly between the same. This plate is secured in position by upwardly turned ears 85 shown as lying outside of the plates 60, and clamped into position by the bolts 63.

If desired, handles 86, shown as secured to the rear flanges of the I-beams may be provided for guiding the sawing devices over the pile.

The operation of our pile sawing device is as follows: The sawing device is suspended by a crane secured to the bail 15 as described and steam or other fluid for rotating the engine 56 may be supplied thereto. The saws are then guided into engagement with the upper portion of a pile 65 and fed therethrough by swinging the entire device toward the same, this movement requiring little or no application of external force as the direction of rotation of the saws tends to feed them through the pile, quickly severing the same. The severed portion then rests partly upon the saws and on the plate 80 and may be easily thrown clear of the sawing device by reversing the engine 56 which is preferably of such a nature that this may be readily accomplished. This reverses the direction of rotation of the saws and quickly moves the severed portion outwardly allowing it to fall away from the device.

When the pile is to be severed below the surface of water the distance beneath the surface may be conveniently measured by graduations 90 painted on the side of the webs of the I-beams and adapted to indicate the distance which the saws stand below the surface of the water.

The saws become reduced in size by repeated sharpening, widening the space between the same so that a single movement across the pile will not sever it, but leave a connecting tongue. In this case the pile may be completely severed by a second movement

across the pile, the device being swung slightly to one side or the other so that one of the saws will complete the severing. To avoid the inconvenience of moving twice across the pile, we may provide for shifting one of the saws toward its companion by providing elongated openings (Fig. 3) in the brackets 24 and 25, thus by loosening the bolts 26 the brackets and shaft may be moved to bring the saw closer to its companion. This makes necessary the shifting of the gear 35 on the shaft 36. Accordingly this gear is positioned between longitudinally movable collars 39.

A frequent use of such a pile sawing device is to saw off the upper ends of a group or row of piles bringing them to an equal height, and it will be at once apparent that the convenience of shifting the sawing device from one pile to another by the operation of a crane carrying the device is an advantageous feature. The construction of the device being such that two saws may operate simultaneously on opposite sides of the pile eliminates the tendency of the sawing operation to turn or revolve the saw frame, and thus permits the suspension by a crane, as described. By the use of two saws the pile may be severed by saws of much smaller diameter than when a single saw is used, which is an advantageous feature owing to the much lower cost of smaller saws and the proportionately greater strength which reduces the liability of breaking.

Having thus described our invention, what we claim is:

1. In a device of the character described, the combination with a frame, means for freely suspending the frame, a plurality of saws at the lower end of the frame adapted to engage the piece to be severed between two of the saws rotating in opposite directions, and means carried by the frame for driving the saws.

2. In a device of the character described, the combination with a frame, means for freely suspending the frame, a pair of saws at the lower end of the frame adapted to engage the piece to be severed, means carried by the frame for driving the saws in opposite directions, and guide members rigid with the frame and positioned adjacent the saws for guiding the frame to bring the saws into engagement at opposite sides of the member to be severed.

3. In a submarine pile sawing device, the combination of a long comparatively narrow frame having a plurality of saws at its lower end, means carried by the frame for driving said saws in opposite directions, and means for freely suspending the frame so that the saws will lie in a substantially horizontal plane.

4. In a submarine pile sawing device, the combination of a long comparatively narrow frame, a pair of saws at the lower end of the frame, a shaft for each saw extending upwardly along the frame, driving mechanism carried by the frame adjacent its upper end, means for freely suspending the frame at its upper end so that the frame may normally depend from the suspending means in a position in which the saw shafts are substantially vertical.

5. In a device of the character described, the combination of a frame adapted to be suspended, a pair of coöperating saws, shafts for each of said saws, means for driving the saws in opposite directions, said saws extending substantially together, a plate lying substantially in the plane of the saws and secured to the frame and serving to support the piece severed by the saws, said means driving the saws being adapted to be quickly reversed driving the saws in opposite directions and serving to throw the severed piece away from the frame.

In testimony whereof, we hereunto affix our signatures.

JESSE E. WILHELM.
WILLIAM W. BONFIELD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."