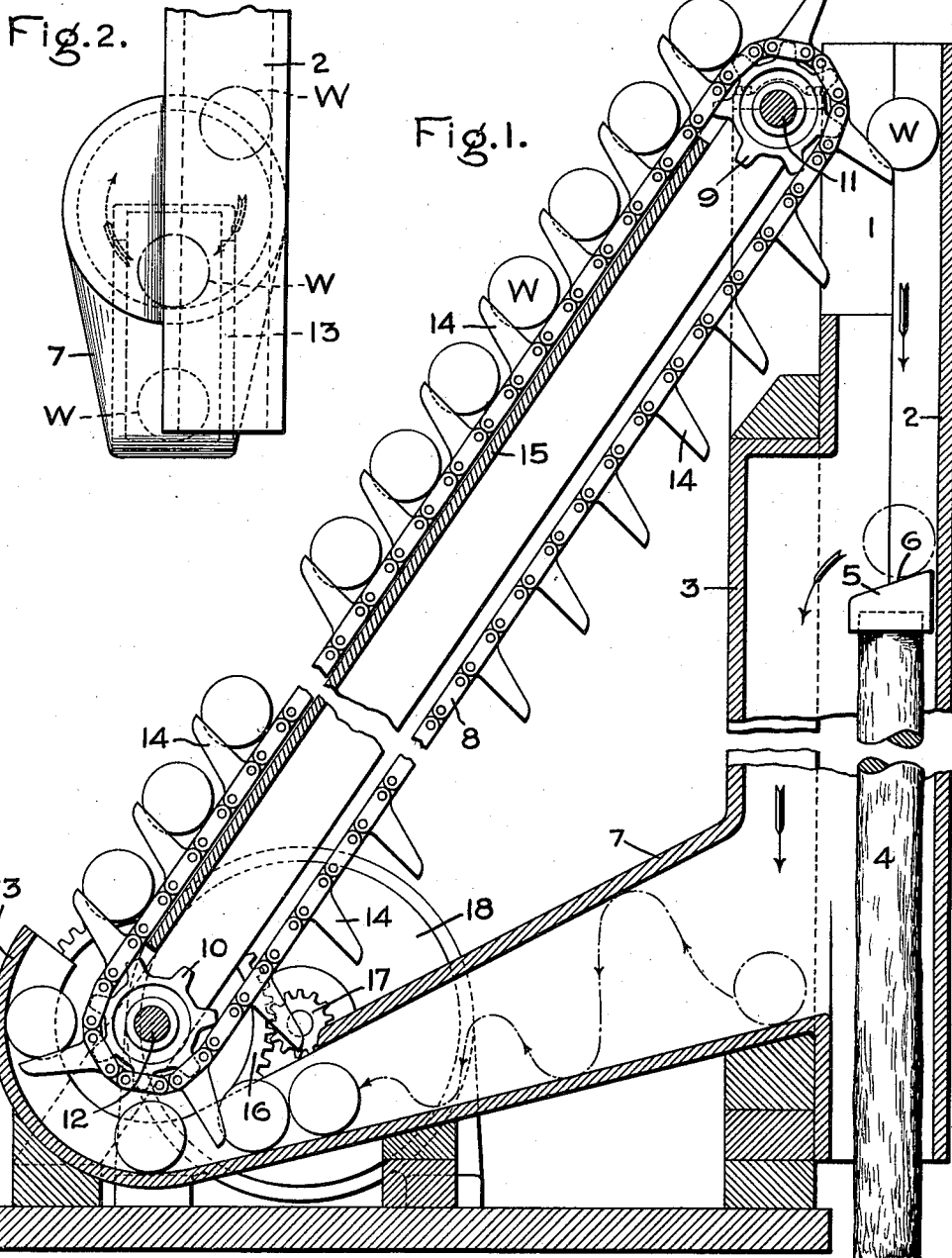


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 F. J. HASKINS, EXECUTRIX.
 ELECTRIC PILE DRIVER.
 APPLICATION FILED FEB. 8, 1912.

1,022,586.

Patented Apr. 9, 1912.

2 SHEETS—SHEET 1.



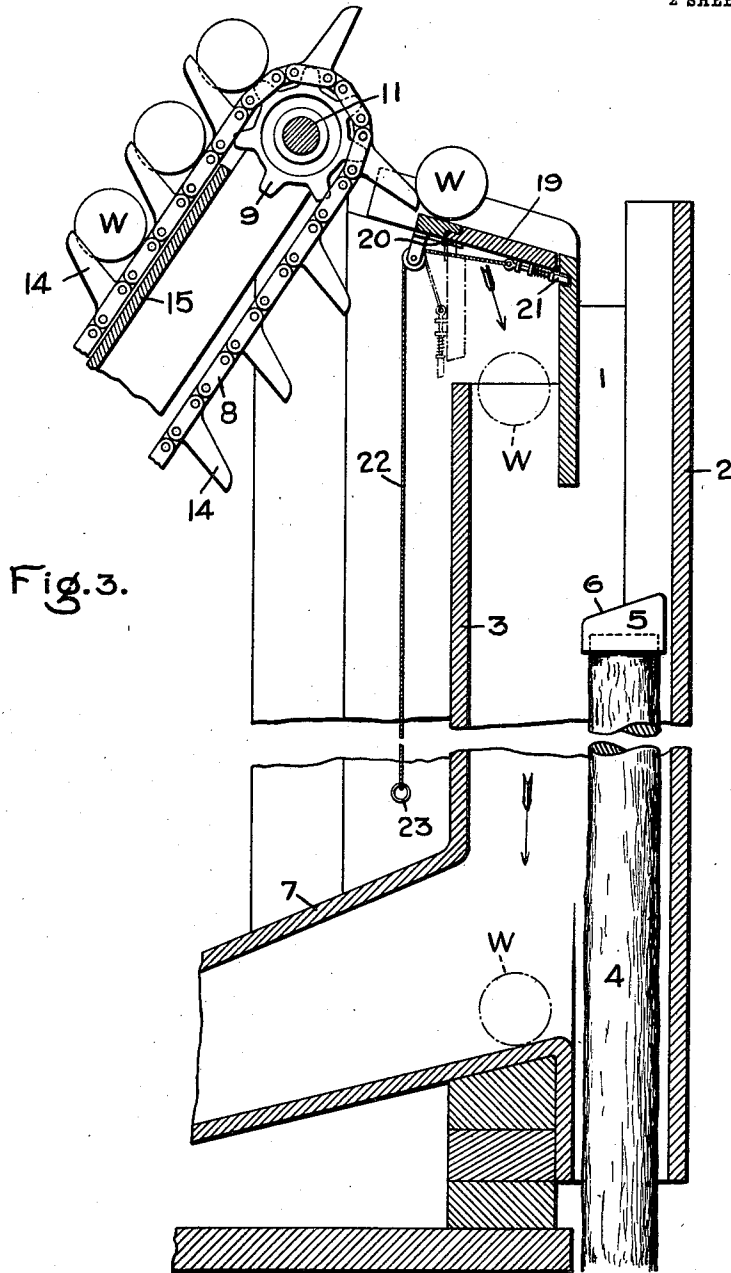
Witnesses:
Marcus L. Byung.
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Inventor:
 Caryl D. Haskins, Deceased
 Frances Julia Haskins, Executrix
 by *Alfred D. Davis*
 Her Attorney.

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UNITED STATES PATENT OFFICE.

CARYL D. HASKINS, DECEASED, LATE OF SCHENECTADY, NEW YORK, BY FRANCES J. HASKINS, EXECUTRIX, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTRIC PILE-DRIVER.

1,022,586.

Specification of Letters Patent.

Patented Apr. 9, 1912.

Application filed February 8, 1912. Serial No. 676,368.

To all whom it may concern:

Be it known that CARYL D. HASKINS, deceased, late a citizen of the United States and a resident of Schenectady, in the county of Schenectady, State of New York, during his lifetime invented certain new and useful Improvements in Electric Pile-Drivers, and that I, FRANCES J. HASKINS, executrix under the last will and testament of the said CARYL D. HASKINS, do hereby declare, to the best of my knowledge and belief, that the following specification, taken in connection with the accompanying drawings, is a clear, true, and complete description of said improvements.

This invention relates to pile drivers and has for its object to produce a device of this character which will give a much more rapid succession of blows than it is possible to obtain with the type of pile driver now in use. Moreover, this invention renders it possible to operate the pile driver with a continuously rotating motor under a substantially constant load. This means that a smaller driving motor operating continuously to drive a pile driver constructed in accordance with this invention, will do the same total amount of work in driving the pile home as a larger motor operating intermittently, as is necessarily the case with the type of pile driver now in use. The substantial constancy in load furnished by a pile driver constructed in accordance with this invention renders it possible to use an electric motor drive with great advantage.

In the operation of a pile driver of the ordinary construction now in use, a single heavy weight is lifted by a suitable motor, generally a steam engine, to a considerable height and is then dropped upon the pile to drive it home. This weight, or monkey as it is called, must be lifted rapidly through distances varying from ten to forty feet, depending upon the force of the blow which is to be delivered. During the time that it is being lifted, the motive device which in ordinary practice is a steam engine, works under full load. This period of full load is followed by one of no load so that the torque of the motive device is continually changing from a maximum to zero and then to maximum again.

The difficulty in successfully applying an electric motor drive to the present type of pile driver results in the fact that the current flowing from the supply mains to the motor will rise from zero to maximum every time the weight is hoisted and dropped. Since the work is very heavy the variation in current flowing from the mains is very large and is likely to produce a fluctuation in the potential of the mains as the load is thrown on or off the motor. Such a fluctuating load in an electrical system of distribution is very objectionable because the variations in potential produced by the fluctuations of the load may affect other devices connected to the same system, as for example, electric lamps which will flicker if the potential of the supply system is caused to vary rapidly through wide limits. The present invention overcomes this difficulty by providing a pile driver construction which will give a substantially constant load on the motive device. This is accomplished by dispensing with the single monkey rising and falling in vertical guides, and substituting therefor a plurality of loose weights, preferably spherical, which are successively lifted by an endless carrier or conveyer and by it successively dropped upon the head of the pile. A motor is geared to this endless conveyer, and as the number of balls upon the conveyer at any given time is approximately constant the load upon the motor will be approximately constant. It can therefore be kept running continuously and, in case an electric motor is employed, with but little variation in the demand for current. Any type of motor can be used, though it is preferred to use a polyphase induction motor. By this invention, therefore, it becomes possible to use an electric motor economically in the operation of pile drivers. The balls are dropped in quick succession upon the head of the pile, delivering their blows much more frequently than is possible with a single monkey, thus greatly accelerating the rate of work and increasing the number of piles which can be driven in a given time. The head of the pile is provided with a metal cap to protect it from battering. Preferably this cap has a beveled or inclined top so arranged that each ball when it

strikes will be deflected to one side into a chute by which it is carried down to the lower end of the conveyer. The chute is so formed as to check the momentum of the balls before they arrive at the conveyer, irrespective of the height from which they may have fallen after leaving the pile.

The details of the invention and the features of patentable novelty will be better understood from the following description in connection with the accompanying drawings, in which—

Figure 1 is a sectional elevation of a pile driver embodying the present invention. Fig. 2 is a front elevation of the lower portion of the same, and Fig. 3 is a sectional elevation of a modification.

In the particular embodiment of the invention which is shown in the drawing the frame of the machine comprises among other things an upright guide tube 1 for the pile 4, said tube being preferably a plank box having a removable front 2 to permit the pile to be put in. Parallel with the guide tube and in the rear thereof is an upright chute 3 which communicates with the tube throughout its entire length by an opening sufficiently wide for the spherical weights W to pass through it, so that they can enter the chute after they have dropped through the upper portion of the tube upon the head of the pile 4. To insure a prompt delivery of the balls W off the head of the pile, a cap 5 is put upon said pile, made of heavy cast iron and having an inclined or beveled top 6 to deflect the balls into the chute. The lower end of the chute communicates with a conduit 7 which conveys the balls to the receiving end of the mechanism which lifts them to the top of the tube 1. This lift or elevator consists preferably of an endless belt or chain 8, running over sprockets or other supporting wheels 9 10. The upper sprocket 9 is mounted on a shaft 11 suitably journaled at the top of the tube 1 in such position as to insure the proper delivery of the balls from the conveyer into said tube. The lower sprocket 10 is mounted on a shaft 12 which is suitably journaled in a framework supporting the outer end of the conduit 7. Concentric with this shaft is a trough 13 into which the balls run from the conduit and from which they are taken up the conveyer or elevator. For this purpose the elevator chain has certain links provided with rigid fingers 14, which are spaced apart far enough to permit a ball to be easily held between any two of them. Owing to the position of the two sprockets the elevator chain stands in an inclined position, the balls being carried upward on its upper side. As the fingers on the under descending side of the elevator arrive at the trough 13 they successively enter between two of the balls and sweep the ball

in front around through the trough, which extends far enough to insure that the ball will rest securely upon the ascending side of the elevator chain before it passes out of said trough. To keep the chain from sagging under the weight of the ascending string of balls, a rigid support 15 is located under the upper side of said chain, over which it can slide with little friction. The shaft 12 of the lower sprocket is provided with means for rotating it to drive the elevator; preferably a spur gear 16 which meshes with a pinion 17 actuated by a motor 18, of any suitable type, but preferably an electric polyphase induction motor. As the number of balls on the ascending side of the elevator is always substantially the same, the load on the motor is thus kept practically constant, which insures its economical and efficient operation, and permits it to keep running all the time. The balls drop one by one upon the cap 5 on the head of the pile, the successive blows being delivered with great rapidity if desired, so that the driving of the pile is effected in much less time than when a single monkey must be raised and dropped. The cap protects the head of the pile from being battered out of shape by the steady bombardment of the falling balls. If the balls were allowed to drop unchecked upon the floor of the conduit 7, it would soon be pounded to pieces. In order to prevent this, the balls are received in a curved portion of said conduit, which merely changes their direction without offering any direct opposition. The conduit is moreover so shaped that the direction of movement of the balls is reversed, so that gravity aids in checking their momentum. Various ways of carrying out this idea may be adopted, but the one preferred is that illustrated in the drawings, where the conduit takes the form of a tube (preferably a cone tapering toward the trough 13) and having its axis slightly inclined downwardly toward said trough. This cone is placed with its base tangent to the chute 3, so that the balls dropping through said chute enter the conduit at one side thereof and sweep around its bottom and up the opposite side (see Fig. 2). If the ball has dropped from a considerable height, its momentum will probably be sufficient to carry it completely around the inside of the conical conduit one or more times, but as its momentum becomes less it will not make an entire revolution but will run up the side of the cone and then down again, cross to the other side, and repeat the same movement, and so on in ever lessening curves until it finally reaches the trough 13 with its momentum so far checked as to allow it to come to a stop against the balls already there without striking them objectionably hard. The exact shape of the

conduit best calculated to produce this result will vary with the size and other features of the particular machine to be equipped, and the dimensions and shape shown in the drawings are to be regarded as simply illustrative and not necessarily limiting the invention to what is there shown.

It may frequently happen that the operator will wish to interrupt the blows upon the pile, either because it has been driven deep enough, or because it must be changed in its alinement, or for some other reason. In such case, the modification shown in Fig. 3 will be found convenient. Here the balls in passing to the top of the guide tube 1 run over a trap door 19 hinged at 20 to the framework of the pile driver, and held normally in position by a spring catch 21. A cord 22 or other operating device is attached to said catch, with a handle 23 in easy reach of the operator, so that by pulling on said cord he can trip the catch and let the door drop, as shown in dotted lines. The door is located vertically over the chute 3, whose upper end is open, so that the balls will drop into it and pass by the pile, when said door has thus been opened. When the driving of the pile is to be resumed, the door can be shut by hand or mechanically, as may be most convenient.

In accordance with the provisions of the patent statutes the principle of the operation of the invention is described, together with the apparatus which is now considered to represent the best embodiment thereof; but it is to be understood that the apparatus shown is only illustrative, and that the invention can be carried out by other means.

What is claimed as new and desire to be secured by Letters Patent of the United States, is:—

1. A pile driver comprising a plurality of loose weights, and means for dropping them successively upon the head of the pile.

2. A pile driver comprising a plurality of loose weights, and means for lifting and dropping them successively.

3. A pile driver comprising a plurality of loose weights, and an elevator for raising said weights and dropping them successively upon the head of the pile.

4. A pile driver comprising a plurality of loose weights, an elevator for raising them, and a motor for operating said elevator.

5. A pile driver comprising a plurality of loose weights, an elevator for raising them, and an electric motor for actuating said elevator.

6. The combination with a pile driver, of an electric motor for actuating it, and means for keeping a substantially constant load upon said motor.

7. A pile driver comprising a plurality of

loose weights, an electric motor for raising said weights, and means for keeping the number of said weights being raised by said motor substantially constant.

8. A pile driver comprising a plurality of loose weights, means for raising said weights and for dropping them successively upon the head of the pile, and means for returning them to the raising mechanism after they have delivered their blows.

9. A pile driver comprising a plurality of loose weights, an endless conveyer for raising said weights and dropping them successively upon the head of the pile, and means for returning them successively to the lower end of said conveyer.

10. A pile driver comprising a plurality of balls, an endless conveyer for raising said balls and dropping them upon the head of the pile in succession, a chute into which said balls pass after delivering their blows, and means for checking the momentum of said balls as they pass from said chute to the lower end of said conveyer.

11. A pile driver comprising a plurality of balls, an endless chain elevator for raising said balls and dropping them successively upon the head of the pile, a chute into which said balls pass after delivering their blows, and means for reversing their direction of movement as they pass from said chute to the lower end of said elevator.

12. A pile driver comprising a plurality of balls, an endless chain elevator for raising said balls and dropping them successively upon the head of the pile, a chute into which said balls pass after delivering their blows, and a tubular conduit connecting said chute with the lower end of said elevator.

13. A pile driver comprising a plurality of balls, an endless elevator for raising said balls and dropping them successively upon the head of the pile, a chute into which said balls pass after delivering their blows, and a tubular conduit connecting said chute with the lower end of said elevator, the receiving end of said conduit being tangent to said chute.

14. A pile driver comprising a plurality of balls, an endless elevator for raising said balls and dropping them successively upon the head of the pile, a chute into which said balls pass after delivering their blows, and a conical conduit having its base tangent to said chute and connecting said chute with the lower end of said elevator.

15. A pile driver comprising a plurality of balls, a guide tube for the pile through which said balls are dropped successively upon the head of said pile, a chute adjacent to said tube and communicating therewith throughout, and means for deflecting said balls from the head of the pile into said chute.

16. A pile driver comprising a plurality of balls, a guide tube for the pile through which said balls are dropped in succession upon the head of the pile, a chute adjacent 5 to said tube and communicating therewith throughout, and a cap for the pile having an inclined top to deflect said balls into said chute.

17. A pile driver comprising a plurality 10 of balls, a guide tube for the pile through which said balls are dropped in succession, a chute adjacent to said tube and communicating therewith throughout, an elevator for

raising said balls to the upper end of said tube, and means for causing said balls to 15 drop into the chute instead of passing to said tube, at the will of the operator.

In witness whereof, I have hereunto set my hand this 6th day of February, 1912.

FRANCES J. HASKINS,
Executrix of the estate of Caryl D. Haskins,
deceased.

Witnesses:

BENJAMIN B. HULL,
HELEN ORFORD.

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