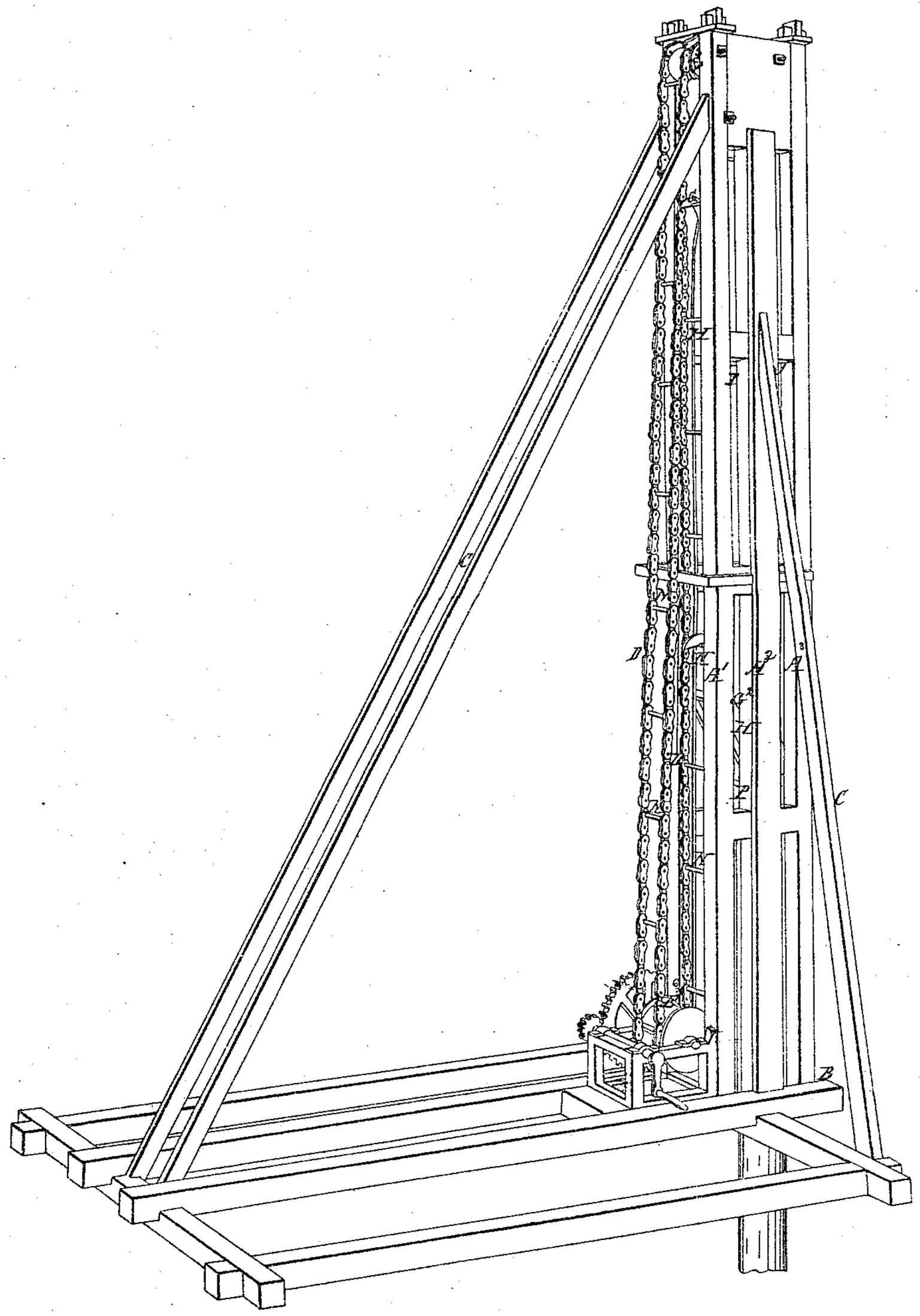
Sheet 1 - 2 Sheets.

R. N. Benson,

Pile Driver,

No. 2,264, Patented Sept. 18, 1841.



Sheet 2 - 2 Sheets.

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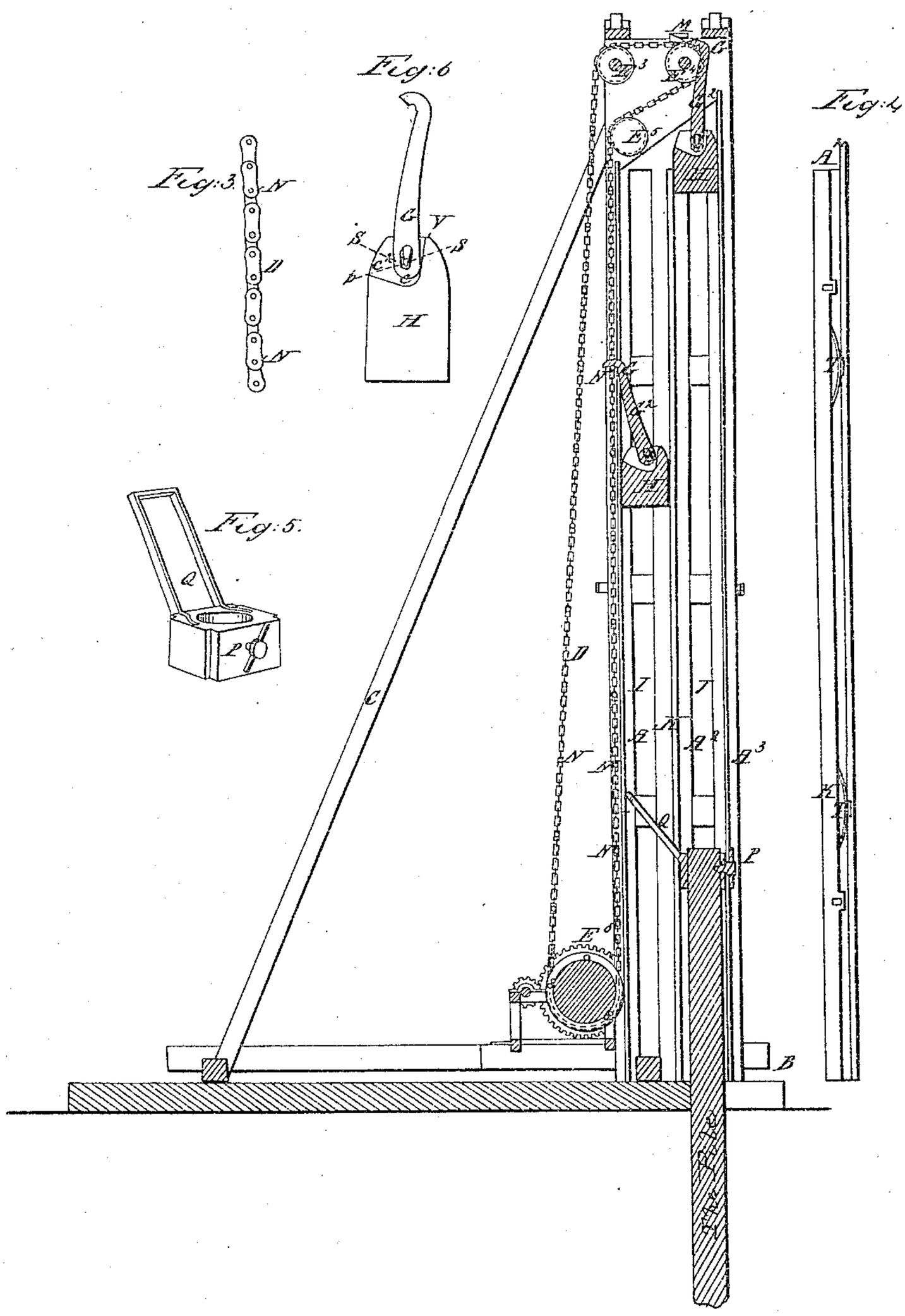
Fig: 2



UNITED STATES PATENT OFFICE.

R. N. BENSON, OF NEW ORLEANS, LOUISIANA.

MACHINE FOR DRIVING PILES.

Specification of Letters Patent No. 2,264, dated September 18, 1841.

To all whom it may concern:

Be it known that I, ROBERT N. BENSON, of the city of New Orleans, in the parish of Orleans and State of Louisiana, have invented a new and useful Improvement in Machines for Driving Piles, which is described as follows, reference being had to the annexed drawings of the same, making part of this specification.

Figure 1 is a perspective view of the machine. Fig. 2 is a vertical longitudinal section. Fig. 3, section of the chain. Fig. 4, section of the ribs and springs. Fig. 5, perspective view of the metallic guide and inclined plane. Fig. 6, section of the hook of the hammer on a large scale.

Similar letters refer to corresponding parts.

My improvement consists in applying a lifting power which is constantly moving upward, instead of the usual method of returning for the hammer after it has been let go. And in using a succession of two or more hammers, or monkeys to multiply the number of strokes in a given time.

My method of effecting these important objects are substantially as follows:

I employ a frame of upright guides or cheeks A^1 A^2 A^3, and base B with braces C, &c., after the general manner of the pile driver now in common use, with such modifications as are hereinafter set forth.

An endless chain D passing over pulleys E at top and bottom of the uprights serves to raise the hammer H to the point from which it is to drop, and a self acting hook G with which the hammer is furnished causes it to fasten to the chain always immediately after the stroke.

As one principal object of my invention is to expedite the operation of the employment of several hammers, to follow one another in quick succession, it is necessary to have two guides I J separate from each other, to prevent collision between the ascending and descending hammers. I therefore make my upright frame with a second place or guide I (in which the hammers are elevated) immediately in front of the chain, and between the chain and the guide for the drop. The two sides or cheeks for the uprights are composed each of three pieces of timber A^1 A^2 A^3 parallel to each other and in a plane parallel to its opposite cheek, the front and middle pair of timbers A^3 A^2 of the two cheeks forming the front guide J and the back pair A^1 with the middle one A^2 forming the back guide I.

The manner in which the hammer is passed from one guide to the other and how this is to be effected at whatsoever height the hammer happens to strike upon the head of the pile, remains to be described.

The hammer H (a horizontal section of which is a square or parallelogram) has four perpendicular sides of half its height, and then diminishes to the top in the form of a section of a pyramid, the top of which is about two thirds the size in the square as the base of the hammer This form of the hammer admits of its being guided by the four corners or angles which are made to run in rabbets in the four contiguous upright timbers before mentioned (that is to say) the inner angle of each of four contiguous timbers is rabbeted, to receive the angle of the hammer, and to guide it up and down as the case may be. Thus the six parallel upright timbers form two such guides the middle timbers A^2 of the two cheeks being common to both guides. The middle timbers A^2 being rabbeted on both their inner angles, would leave a projecting rib on their faces, which rib would be between the hammers ascending and those that were descending forming the partition between the two spaces which are here called the guides; but for reasons already mentioned (viz, that the hammers must change places or guides, on their arrival at either end of their motion) these partition ribs are made movable, and retreat out of the way while the hammer is being passed from one of these guides to the other returning immediately to its place after the hammer has passed through. Instead therefore of rabbeting the angles of these middle timbers A^2 as I do in the other four A^1 A^3.

I form the partition ribs K of flat bars of wood or metal (the latter is preferred) let into grooves in their respective timbers A^2 in or near their inner faces and projecting edgewise beyond the inner faces of the timbers so as to form the required ribs. The manner in which this rib is movable is as follows: The bars that constitute the ribs are let edgewise into their respective timbers, sufficiently deep to allow them to retreat their whole breadth into the timbers and to admit of springs T being placed behind them by which they are shot out again to their places or guides. The ham-

mer is drawn through between these movable ribs, both above, and below by the motion of the chain to which it is attached. Immediately on striking the pile, the hook of the hammer (which is at the extremity of an arm or rod M from the top of the hammer to the chain) takes hold of the chain and as the hammer is necessarily at a considerable distance from the chain and the line of connection nearly horizontal the top of the hammer is drawn over toward the chain, as it begins to rise. Now the upper end of the hammer being tapered admits this end to wedge between the movable partition ribs K depressing them into the grooves, and the weight of the hammer, in finding its lowest position from the point of suspension, forces it through to the other guide, where it follows the chain to the upper part of the guides.

The next thing requisite is to show how I shift the hammer to the front guide J and then describe my method of disengaging it from the chain. In my arrangement of the chain I pass it over a pair of pulleys E^5 at the top of the guide, and run its course obliquely over the front guide J and return it over another pair of pulleys E^4 back again to the back part of the frame, where turning a third pair of pulleys E^3 it descends to the lower pulley E^6 (or more properly the driving wheel) where uniting with the ascending side it forms the endless chain before named. The chain D is constructed by two parallel chains connected together at intervals by round cross bars of iron N which are riveted at the ends to two chains and the cross bars or rounds are the parts of the chain to which the hook of the hammer attaches itself by falling across it after the stroke; they also serve to take hold on the driving wheel, E^6, (teeth) which is a toothed spur wheel of a suitable breadth to pass between the sides of the chain and let the cross bars fall into the teeth.

The hook rod G^2 being jointed to the hammer, in such a manner as to permit it falling only one way, viz toward the chain, the hammer on arriving at the oblique position of the chain, at the top of the guides, is by the rod N to which it is suspended inclined, or leaned over, toward the front guide J by which means it wedges between the partition ribs and forces through, as before described, where it assumes a perpendicular position in the front guide J. At this point, the chain returns around the second pair of pulleys (before mentioned) E^4, carrying the hammer upward until the hook has reached the top of the pulley E^4, when the projecting end of the hook, rides up an inclined plane M and lifts it off from the cross bar N of the chain, allowing the latter to pass from under it, when it falls from the inclined plane and the hammer descends in its guide J. The hook rod being heavier on the side toward the chain, falls toward it, and lodges on one of the cross bars, N whenever it is left to itself. The first and second pair of pulleys E^4 E^5 over which the chain passes, at top cannot be connected between, as the rod of the hook must pass between them, the third pair E^3 may be joined across from one to the other, the center pins of the others are connected with the side cheeks, and are supported in side of the pulleys, by bridles bolted to the frame.

The lower end of the hook G is perforated with an oblong slot, in which is placed two springs S S, fastened by pins, or screws, to the sides of the slots, between which the pins *p* passes which unites the hook to the monkey which will be gripped by said springs and will hold the hook in a vertical position and prevent it from descending until the blow be given when the hook will descend—the length of said slot while the shoulder V and heavier side of the hook cause the hook to fall upon one of the rounds of the chain.

A metallic guide P for holding the head of the pile in the center of the front guide J while receiving the blow from the monkeys is placed in the front guide J being perforated in the center to receive the head of the pile and grooved at the four corners to correspond with the inner four corners of the front guide in which it moves and having an inclined plane Q or frame extending from its inner upper edge into the back guide I to prevent the monkey from surging into said gnide in raising it from the head of the pile for another blow; which inclined plane Q is composed of two parallel arms united at their outer extremities by a cross bar, and hinged to a metallic guide descending with it as the pile descends. When the pile is driven this inclined plane and guide are raised to the top of the machine by a fall and held while the fall descends to raise a pile which is to be placed and secured in the metallic guide when the operation is repeated. The fall is made in the usual manner.

The machine being put in motion by steam or other power the chain will have a continuous motion while the hammers will be raised and let fall in succession there being one hammer always in each guide. When the hammer H′ (which has just been drawn over from guide I into guide J and is on the point of leaving the chain by its hook G coming in contact with the inclined plane M) arrives at the top of the guide J its hook G passes up over the inclined plane until it is liberated from the round N of the chain when its gravity causes it to descend upon the head of the pile—the springs S S

fastened to the sides of the oblong slot in the lower end of the arm of the hook pressing against the pin p of the hammer cause the hook to be held in a vertical position until the hammer strikes the pile when the jar drives the lower end of the hook down into the cavity c in the head of the hammer—disengages the pin p from the springs S and brings the pin in the upper or larger part of the slot of the hook and at the same time agitating the hook violently, which, striking against the shoulder V at the head of the hammer back of the hook causes the hook to be thrown over upon the chain—the side of the hammer, at the head, opposite the aforesaid shoulder being open at c^2 to prevent the hook from meeting with an obstruction in falling over upon the round of the chain. The motion of the chain being continuous and the hook being engaged with it in the manner just described the hammer is drawn over from the guide J into the guide I—the inclined plane Q upon which it slides preventing it from passing from the guide J into the guide I violently or surging, as it is termed. In passing from one guide to the other the spring ribs K K have to be receded into their grooves to permit the hammer to pass through between them—this is done by means of the hammer itself which is made of a wedge form at the head for that purpose, so that as the hammer is canted over and drawn forward its wedge formed end passes first between the spring ribs, and the hammer continuing to be drawn forward by the chain the ribs are necessarily crowded laterally into their grooves, at the same time contracting the springs placed behind them; which, as soon as the hammer has passed through again throw the ribs out of their former position in extending themselves. When the hammer arrives at the top of the guide I it again acts upon the ribs in the same manner as that just described in passing back from the guide I into the guide J to be let fall upon the pile:—in this case the chain in taking an oblique upward direction from one guide to the other by means of the arrangement of the pulley E^4 around which it is passed first draws the wedge formed end of the hammer between the ribs K and crowds them laterally out of the way of the hammer when the lower or larger end of the hammer passes through and the hammer swings over into the guides J and ribs K are instantly thrown out again into their former position.

What I claim as my improvement and of my own invention or discovery, in the above described machine, and for the use of which I ask an exclusive privilege, is—

1. The method of raising the monkeys or hammers H in succession by means of the endless chain or belt D constructed and operating as herein described.

2. And I also claim the double spring guide constructed in the manner and for the purpose herein described.

ROBERT N. BENSON.

Witnesses:
EDM. MAHER,
WM. P. ELLIOT.