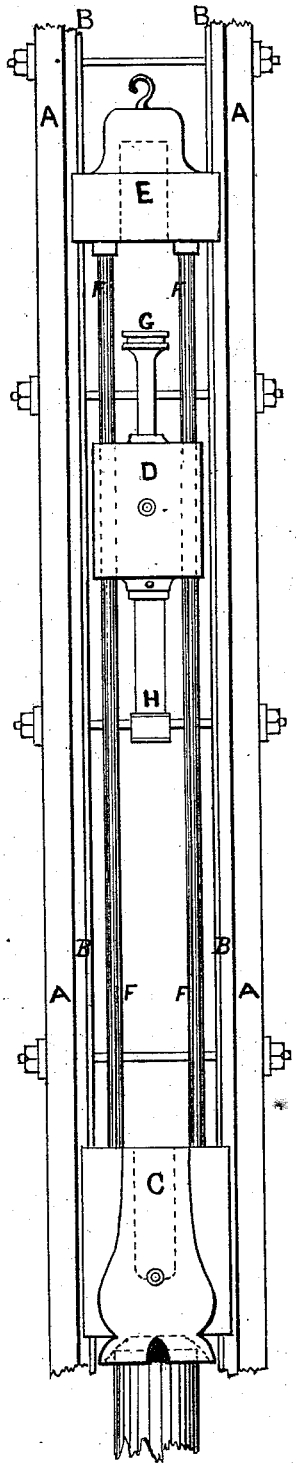
J. M. ALLEN.

Explosive Pile-Driver.

No. 161,373. Patented March 30, 1875.



Witnesses,

John F Coyne.

W. B. Ridgway

Inventor.,

James M. Allen

By. David A. Burr

Atty.

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

UNITED STATES PATENT OFFICE.

JAMES M. ALLEN, OF BALTIMORE, MARYLAND, ASSIGNOR TO FRANKLIN B. COLTON, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN EXPLOSIVE PILE-DRIVERS.

Specification forming part of Letters Patent No. **161,373**, dated March 30, 1875; application filed March 10, 1875.

To all whom it may concern:

Be it known that I, JAMES M. ALLEN, of Baltimore, in the State of Maryland, have invented an Improvement in Gunpowder Pile-Drivers, of which the following is a specification:

In the construction of powder pile-driving machines it has been found necessary to make the frame-work much stronger than for ordinary pile-drivers, and to fit the same, at great cost, with ways or guides of steel, extending, in sections, the entire height of the frame, so as to withstand the shock and strain incident to the sudden movement of the ram over the ways in its passage to and from the gun at each discharge, and to secure the directness of movement of the ram into the gun, which is absolutely essential to success with the machine. The object of my invention is to avoid the expense of metallic ways, and of extraordinarily strong fittings in the construction of a powder pile-driver, and to insure greater accuracy and certainty in the movements of the ram. It consists in guiding the movements of the ram to and from the gun by means of guide-rods secured to and projecting from the gun independently of the frame-work and ways, by which the gun is itself guided and confined over the pile to be driven, so that the ram and gun, which constitute the essential distinctive features of a gunpowder pile-driver, may, in fact, be used in the frame-work of any ordinary pile-driver.

The accompanying drawing is an elevation of a portion of the frame of a pile-driver having my improvement combined therewith.

A A are strong uprights, braced and supported by a ladder in the rear, and combined with platforms and diagonal struts, in the customary manner, to constitute the frame-work of the machine. B B are ways formed of wood or metal, which serve to guide the vertical movement of the hammer-block or gun C. Thus far the construction of the machine need not differ from that of any of the ordinary pile-drivers in general use, and does not involve any additional outlay. C is a gun of steel or iron, such as is used in Shaw's gunpowder pile-driver. It is recessed on its under face to receive the head of the pile, and bored centrally in its upper end to receive (nearly air-tight) a piston or plunger fitted upon a ram, D, to drop thereinto. E is a metallic head or stop-block, also fitted to work vertically between the ways B B of the frame, and which is bored out centrally on its under side to receive a second piston on the ram D. F F are steel guide bars or rods extending between and rigidly secured at either end to the head-block E and to the gun C, respectively. These bars may be so arranged as to admit of an adjustment of the distance between the head-block and gun to suit different weights of rams and cartridges used with the machine, but an interval of about fifteen feet will be found suitable under ordinary conditions. The head-block E, guides F F, and gun C, thus rigidly combined, move as one piece between the ways B B, and are elevated by the ordinary appliances to the top of the frame as required for the purpose of inserting a pile under the gun. D is a solid metallic block, constituting the ram of the machine. This block is fitted upon the guide-bars F F, so as to move thereon freely between the gun C and head-block E independently of the ways B B. G and H are pistons projecting centrally from its upper end to enter the cylindrical chamber bored in the head-block E, and from its lower end to enter the corresponding bore in the gun C. These pistons are suitably packed, so as to enter their respective cylinders with an air-tight joint and operate to compress the air therein. The air thus compressed in the head-block E, by the upward movement of the ram, serves as a cushion to check its momentum and arrest its movement without shock or jar, while the compression of air in the bore of the gun by the sudden fall of the lower plunger thereinto when the ram drops not only prevents the shock and concussion which would otherwise attend the hard contact of metal to metal, but, furthermore, evolves sufficient heat to fire a cartridge placed in the gun, and adds to the projectile force of the exploded powder the expansive power of the air when thus suddenly compressed and heated. The rigid connection of the guides F F to the gun and head-block insures the exact entrance of the ram

into the bore of the gun, guiding the plunger into its cylinder with unfailing accuracy, under all circumstances, independently of the frame-work of the machine, which serves merely to stay and support the gun and head-block over or upon the pile. Suitable brakes are arranged between the gun and head-block, by means whereof the ram is automatically caught when its upward movement is completed, and held until its fall is desired.

The operation of this improved machine is as follows: The head-block, ram, and gun are hoisted all together by means of suitable tackle attached to the head-block, and operated by the hoisting-engine to such height in the frame as may be required to permit the insertion of a pile in position under the gun, and are then lowered until the gun rests upon the head of the pile. The ram is then raised, a cartridge placed in the gun, the brake released, and the plunger of the ram falling into the bore of the gun starts the pile downward, and produces an explosion of the cartridge, whereby the motion of the pile is enormously accelerated. At the same time the ram is thrown upward to be checked by the entrance of its upper plunger into the bore of the head-block, and held by the application of the brake. Another cartridge is now placed in the gun, the ram released, another explosion takes places, continuing the driving of the pile, and throwing up the ram to be again arrested. In the meantime the gun, following the pile, carries with it the guides, head-block, and brakes for the ram, the length of the guide and brake devices remaining constant irrespective of the length of the pile.

I claim as my invention—

Guide-rods F F and a head-block, E, combined with the ram D and gun C of a powder pile-driver, substantially in the manner and for the purpose herein set forth.

JAMES M. ALLEN.

Witnesses:

E. J. CODD,

J. V. CAMPBELL.