

Aug. 9, 1938.

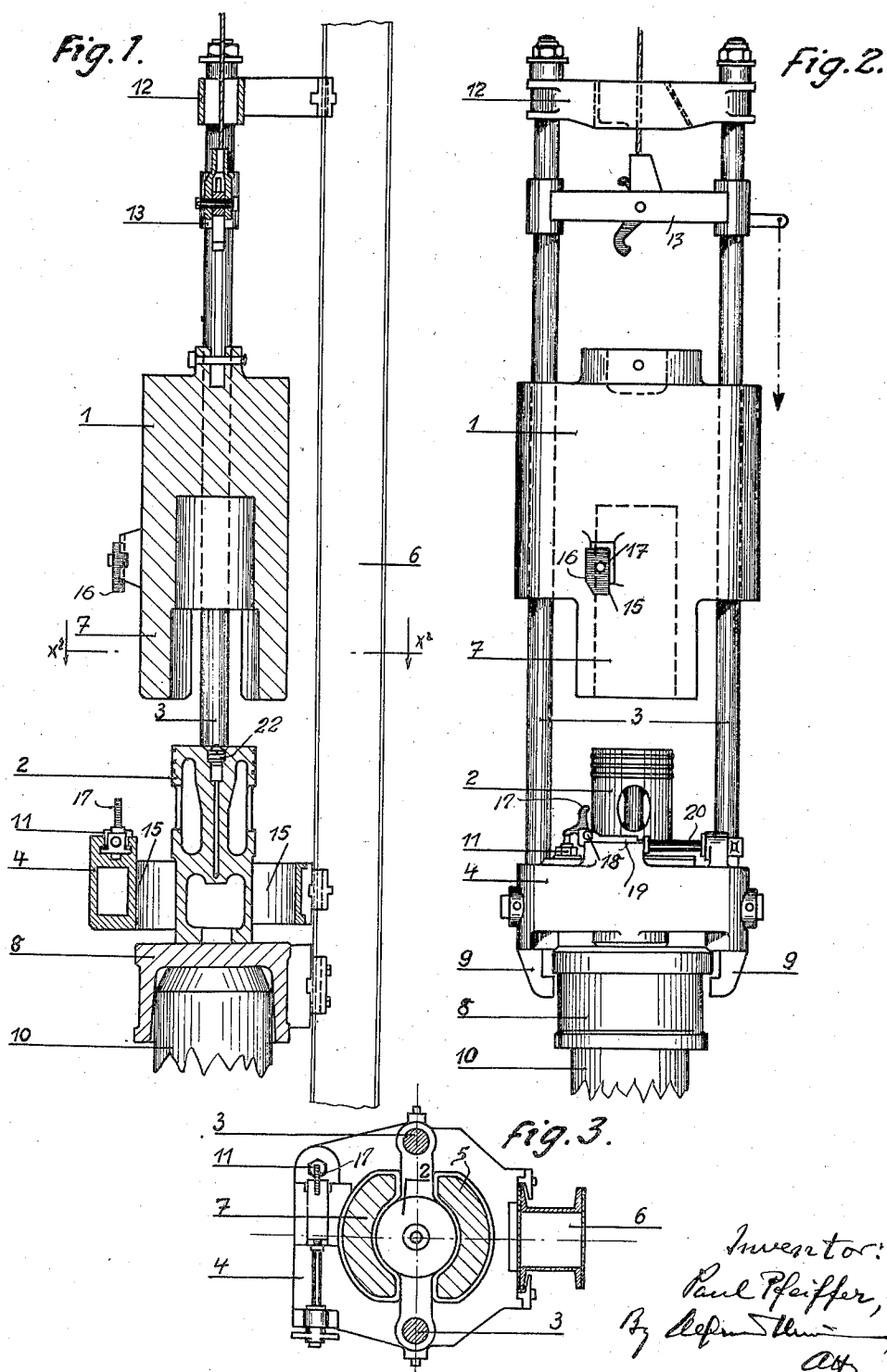
P. PFEIFFER

2,126,409

DIESEL PILE DRIVER

Filed March 6, 1936

2 Sheets-Sheet 1



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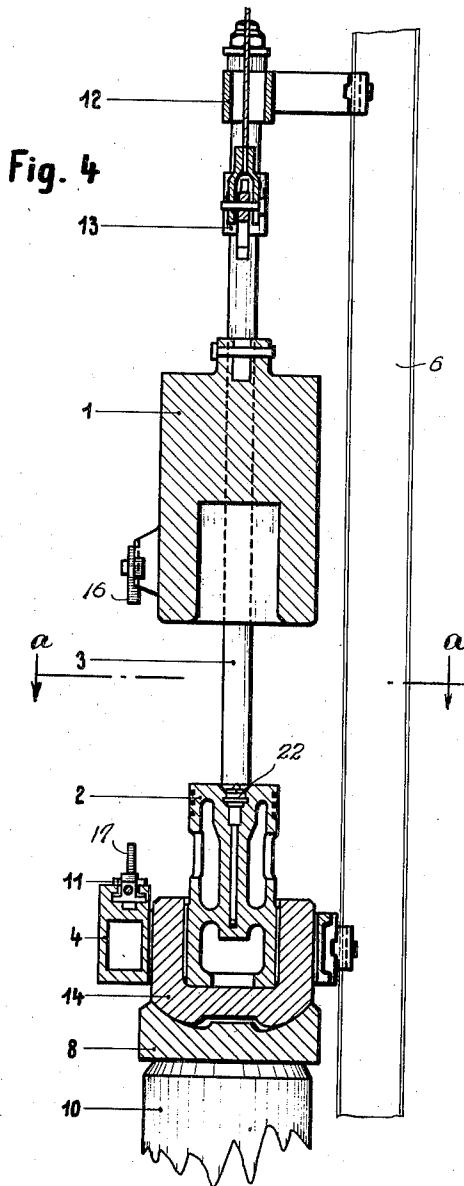
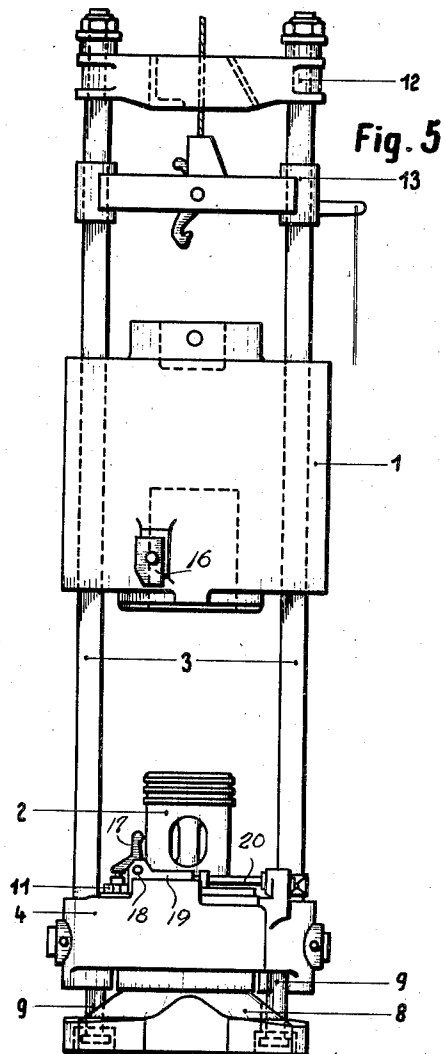
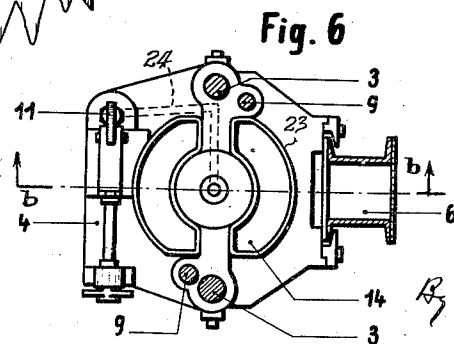
P. PFEIFFER

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2 Sheets-Sheet 2



Inventor:
Paul Pfeiffer,
By *Alfred Stein*
Att.

UNITED STATES PATENT OFFICE

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DIESEL PILE DRIVER

Paul Pfeiffer, Altona-Hamburg, Germany

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6 Claims. (Cl. 61-73)

My invention relates to pile drivers operating on the Diesel principle, in which the piston is located on the anvil and in which the working cylinder acting as the ram is so arranged that upon its upward stroke it can separate from the piston a distance several times the height of the same. In such pile drivers the piston is guarded against too great stresses in that between the piston and the anvil there is provided a gliding connection in axial direction adapted to lead upon the operation of the ram. In other words, the piston is capable of longitudinal displacement relative to the anvil.

The principal object of the present invention is to provide a piston which is separate from the anvil resting loosely thereon and being by means of a cross-piece directly guided on the stanchion of the pile driver while the guide-rods for the cylinder-ram are with their lower ends also connected to said cross-piece, their upper ends being secured in a cross-head, which also is guided on the stanchion of the pile-driver.

In this manner, the sensitive parts of the piston, the fuel-pump and its accessories can be mounted on the cross-piece which is protected against shocks and blows.

The piston and the anvil are loosely connected by claws enabling the piston and the anvil to be raised together after the ramming work is completed.

In the appended drawings I have shown, by way of illustration, two embodiments of my invention. In these drawings,

Fig. 1 is a vertical sectional view of one embodiment, Fig. 2 being a front elevation thereof and Fig. 3 a plan view in section along line *x-x* in Fig. 1;

Fig. 4 is a similar view to Fig. 1 showing another embodiment, the section being taken along line *b-b* in Fig. 6; Fig. 5 is a front elevation of Fig. 4, while Fig. 6 is a plan view in section along line *a-a* in Fig. 4.

At 1 in Figs. 1 and 2 is shown the cylinder constituting the ram. At 2 is shown the piston being provided with a cross-piece 4, whereby the piston is guided along the stanchion shown in Fig. 1 at 6. At 12 is shown a cross-head likewise guided along the stanchion 6, and this cross-head is connected with the cross-piece 4 by guide-rods 3, on which is slidably mounted the cylinder-ram 1. The latter, as shown in Figs. 1 and 2, is formed with impact portions 7, which, upon the downward stroke of the cylinder-ram 1 pass through corresponding apertures 15 in the cross-piece 4 striking the anvil shown at 8. The latter,

as shown in Fig. 1, is guided on the stanchion 6.

At 9 in Fig. 2 are shown claws, forming a loose connection between the anvil 8 and the cross-piece 4 of piston 2 so that when after the completion of the ramming work, the entire assembly of the parts is lifted by means of a cable attached to the head shown at 13 in Figs. 1 and 2, the anvil 8 will be lifted together with the piston. As shown in Fig. 2, there is play between the claws 9 and the anvil so that the latter can move vertically relative to the piston 2.

On the cross-piece 4 of the piston is mounted the fuel-pump shown in Fig. 1 at 11. At 16 in Figs. 1 and 2 is shown a cam provided on the cylinder-ram 1 in such a position that shortly before the latter strikes the anvil 8, a small bell-crank shown at 17 in Fig. 2 is rocked by said cam 16 about its pivot 18 to operate the fuel pump 11, as will clearly appear from Fig. 2. The pivot pin 18 of bell-crank 17 is carried by a horizontal slide shown in Fig. 2 at 19, while at 20 is shown a spindle engaging said slide, whereby the latter can be displaced in either direction. The further the pivot pin 18 is moved toward the right in Fig. 2, the greater will be the angle through which the bell-crank 17 is rocked by the cam 16 about its pivot, and the greater will be the amount of fuel fed by the fuel pump with the result that the cylinder-ram 1 will be given a greater upward stroke. The fuel, as will be seen from Fig. 1, is supplied under pressure to the nozzle 22 shown in Fig. 1, whereby the fuel is injected into the explosion chamber, in which the fuel is ignited by the highly compressed heated air, the high compression being produced by the drop of the cylinder-ram 1. If by means of spindle 20 the slide 19 is, on the other hand, moved far enough toward the left in Fig. 2, the cam 16 on cylinder-ram 1 will no longer engage the bell-crank 17, and consequently no more fuel will be fed by the fuel pump 11 to nozzle 22. The cylinder-ram will, therefore, no longer be operated.

In the modification shown in Figs. 4-6, the cylinder-ram 1 is not provided with impact parts adapted to strike the anvil, but there is provided a separate impact member shown at 14 in Fig. 4, which is guided in the cross-piece 4 of the piston 2 and rests with a spherical face on a correspondingly shaped face of the anvil 8. The latter is held in position by the rods 9 shown in Fig. 5, and being guided by the spherical face of impact member 14 needs no means to guide it on the stanchion 6. The impact imparted to the impact member 14 by the cylinder-ram 1 is transmitted to the anvil 8, which rests on top of the

pile to be driven, shown at 10 in Fig. 4. Since the impact member 14 is in sliding relation to piston 2 or its cross-piece 4, the latter parts, together with the guide-rods 3 and the cross-head 12, remain unaffected by the impacts of the cylinder-ram. Directly after each impact, the parts just referred to, descend by their own weight.

As shown in Fig. 6, the cross-piece 4 of piston 2 is provided with two sector-shaped openings 23 for the guidance of the impact member 14.

The operation of the fuel-pump 11 is the same as has been described with respect to Figs. 1 and 2, and in Figs. 4 and 5, therefore, the same reference numerals have been used, since all the parts relating to the feeding of the fuel are identical with those shown in Figs. 1 and 2. The conduit for conducting the fuel from the fuel pump to the nozzle in the piston is indicated by the broken lines 24 in Fig. 6.

As will be evident from the foregoing description and the drawings, in both embodiments of the invention, the piston together with the fuel-pump and the fuel-injecting nozzle is effectively guarded against the blows and shocks caused by the impacts of the cylinder-ram.

While in the two embodiments shown in the drawings, the piston rests on the anvil and the cylinder is the movable part, this, of course, may be reversed in cases where it is desirable to make the piston the movable part.

What I claim is:

1. In an explosion operated pile driver, in combination with a stanchion, a cross-head guided thereon and an anvil to be seated on the pile to be driven, of a piston adapted to loosely rest on said anvil and formed with a cross-piece guided on said stanchion, guide-rods connecting said cross-head and the cross-piece on said piston, and a working cylinder constituting the ram for imparting impacts to said anvil, said cylinder being movable relative to said piston and guided by said guide-rods, said cylinder and piston being free to separate a substantial distance.

2. In an explosion operated pile driver, in combination with a stanchion, a cross-head guided

thereon and an anvil to be seated on the pile to be driven, of a piston adapted to loosely rest on said anvil and formed with a cross-piece guided on said stanchion, guide-rods connecting said cross-head and the cross-piece on said piston, a working cylinder constituting the ram for imparting impacts to said anvil, said cylinder being movable relative to said piston and guided by said guide-rods, a fuel-pump mounted on the cross-piece of said piston, a bell-crank pivoted on said cross-piece and adapted to operate the piston of said fuel-pump, and a cam on said cylinder for operating said fuel-pump by means of said bell-crank upon the completion of the ramming stroke of the cylinder.

3. The combination as specified in claim 2, including a slide mounted on the cross-piece of said piston and carrying the pivot pin of said bell-crank, and a means for displacing said slide thereby adjusting the position of said bell-crank relative to said cam.

4. In an explosion operated pile driver, in combination with a stanchion, a cross-head guided thereon and an anvil to be seated on the pile to be driven, of a movable piston adapted to loosely rest on said anvil and formed with a cross-piece guided on said stanchion, guide-rods connecting said cross-head and the cross-piece on said piston, a working cylinder constituting the ram for imparting impacts to said anvil, said cylinder being movable relative to said piston and guided by said guide-rods, and an impact member provided intermediate said cylinder and said anvil.

5. The combination as specified in claim 1, in which said anvil is guided on said stanchion and including means loosely connecting said anvil and the cross-piece on said piston permitting relative play between said parts.

6. An explosion operated pile-driver as specified in claim 4, in which the impact member has a spherical seating surface in contact with a corresponding depression in said anvil enabling said impact member to automatically adjust itself relative to said anvil.

PAUL PFEIFFER. 45