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[54] **DIESEL PILE DRIVER FOR IMPACT ATOMIZATION**

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[51] **Int. Cl.** **E02d 7/12**

[58] **Field of Search** ..... 173/128, 135, 137; 123/46 SC, 46 H

[56] **References Cited**

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[57] **ABSTRACT**

A Diesel pile driver, in which a piston operable to impact upon the impact area of an impact member atomizes the fuel conveyed by a metering pump onto the impact area of the impact member, the impact surface of said piston and the impact area of said impact member which is adapted to receive the fuel from said metering pump respectively forming plane surfaces substantially parallel to each other.

2 Claims, 2 Drawing Figures

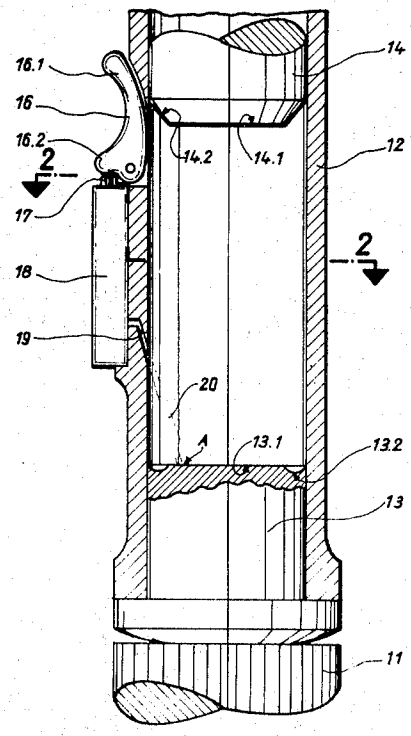


Fig. 1

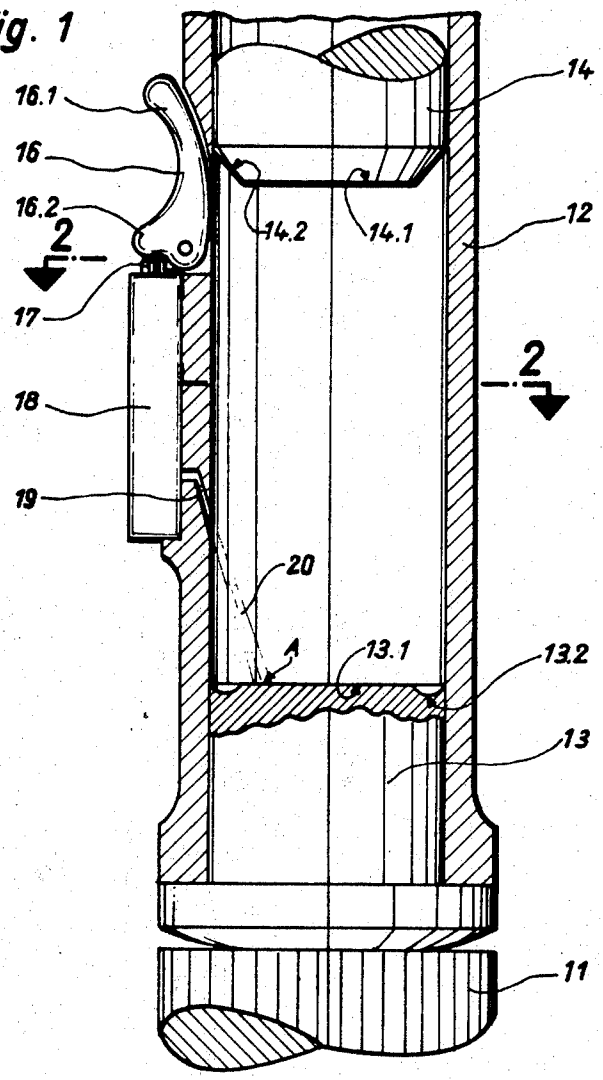
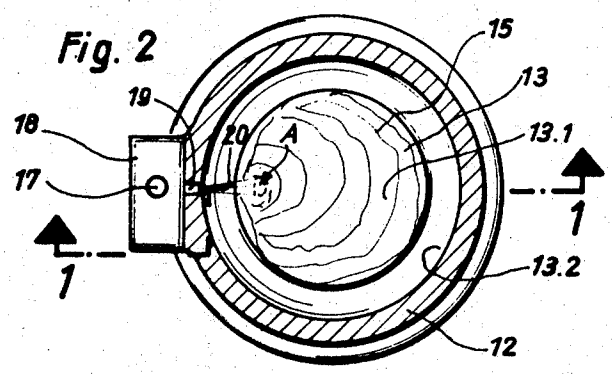


Fig. 2



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DIESEL PILE DRIVER FOR IMPACT ATOMIZATION

The present invention relates to a Diesel pile driver for impact atomization. The invention is based on a pile driver for impact atomization according to which a piston at its impact atomizes the fuel conveyed by a measuring pump to the impact surface of the impact element.

With these heretofore known Diesel pile drivers employed for decades, the impact surface of the impact elements has been designed as a pan because the opinion prevailed that the fuel meted out by a measuring pump and not yet atomized had to collect on the bottom of said pan in order to be atomized eventually from the impacting piston by means of its ball-shaped end face shaped in conformity with the shape of the pan.

In this connection the art has put up with the fact that the manufacture of such ball-shaped surfaces requires expensive work and that when these ball-shaped surfaces wear, restoring the said ball shape can be carried out only by highly skilled workers and sometimes only by the manufacturer of the ram. Also in operation, certain disadvantages have been put up with. These disadvantages are due to the fact that the unavoidable play of the piston and also of the impact member or element in the cylinder produce certain lateral offsetting and eccentricities. These, in their turn, reduce the efficiency of the atomization. Furthermore, this lateral offsetting and causing of eccentricities bring about an undue wear on the ball-shaped surfaces whereby the degree of atomization of the impact atomization will be decreased further. Moreover, these eccentric impacts give rise to considerable transverse forces on the entire ram which forces, if breakage is to be avoided require a particularly strong design for the ram. It may be mentioned in this connection that a Diesel pile driver comprising a ram and a reciprocable Diesel hammer in conformity with terminology used in the patent literature is designated a Diesel pile driver.

It is an object of the present invention so to design a Diesel pile driver of the above general type that the fuel will have imposed thereupon a component of movement which distributes the fuel practically over the entire impact surface of the impact member.

This object and other objects and advantages of the invention will appear more clearly from the following specification, in connection with the accompanying drawing, in which:

FIG. 1 illustrates a longitudinal section taken along the line I — I of FIG. 2, said section being taken through the lower portion of the Diesel pile driver, and showing a certain phase of the working cycle of the Diesel pile driver.

FIG. 2 is a cross section taken along the line II — II of FIG. 1.

The present invention starts with the surprising finding that the fuel in not yet atmoized condition is distributed over a plane surface within the short available time, to such an extent in a moistening manner over the entire plane impact surface that also in such an instance the impact atomization can be realized by means of piston and impact member with plane end surfaces.

Referring now to the drawing in detail, in the particular example shown in the drawing, that phase of operating the Diesel pile driver is shown during which an impact member **13** rests on the upper end face of the pole

11 to be driven into the ground, while the lower end of the Diesel pile driver cylinder **12** rests upon the impact member **13.** It is in said cylinder **12** that the impact member is guided, which latter has a plane upper end face or impact area **13.1** and also has a circular groove **13.2.** Upon this plane end face **13.1** of the impact member **13,** there will impact the lower end face or impact surface **14.1** of the Diesel pile driver **14** which moves downwardly from the illustrated position. This end face **14.1** is surrounded by a conical incline **14.2** The annular cylinder chamber which is left free by the incline **14.2,** will, together with the annular groove **13.2** of the impact member, form an annular compression chamber when the end faces **13.1** and **14.1** engage each other, said end faces **13.1** and **14.1** acting as impact surfaces.

After the fuel has previously been atomized by the plane surfaces **13.1** and **14.1** impacting upon each other, the fuel is radially centrifuged into said annular chamber, which fuel has been applied in the form of a moistening film to the impact surface **13.1.** In view of the pressure prevailing in this compression chamber, the atomized fuel will be able to combust. In view of the explosion-like increase in pressure the piston **14** is thrown up again.

The outside of cylinder **12** has associated therewith a metering device **18** for metering out the quantity of fuel required for each individual combustion operation. A fuel measuring pump associated with said measuring device **18** is so designed and arranged that the fuel in the form of a not yet atomized jet will be conveyed into the cylinder at an instant at which the inner space of the cylinder at a corresponding position of the piston **14** will by opening a nonillustrated air admission and combustion gas exhaust offer practically no or only slight over pressure. The admixing device has a double lever **16** having its arm **16.1** extending into the inner chamber of the cylinder **12,** and with all these parts is arranged below the piston **14** occupying its upward position. The double lever **16** is pivotally mounted on the cylinder and will have its other arm **16.2** engaging the upper end **17** of the nonillustrated piston pertaining to the metering pump arranged at the circumference of cylinder **12.** According to the showing of FIG. **1,** the upwardly moving piston **14** has, by means of its circumference, moved the arm **16.1** of this double lever **16** out of the cylinder chamber and has pivoted the entire double lever **16.** During this pivot movement, the other arm **16.2** has, by means of the piston end **17,** pressed the piston of the metering pump downwardly. Consequently, the fuel is in a predetermined quantity conveyed in the form of a closed jet **20** through a passage **19** onto the impact curface **13.1** of the impact member **13.** Jet **20** will at an incline, at a point A impact upon said surface **13.1.** The impact area A is offset from the center of the surface toward the metering pump, and the jet **20** is so inclined that the impacting fuel will on the plane impact surface **13.1** have imposed thereupon a component of movement by means of which from said point A the fuel jet in the form of an expanding thin film **15** will be distributed toward the circumference of the surface **13.1.** With such distribution, the impact surfaces **13.1** and **14.1** impacting upon each other will bring about a particularly fine atomization of the fuel.

The feeding line for the fuel and the above mentioned inlet and outlet slots for fuel and scavenging air

and combustion gas have not been shown in the drawing, inasmuch as the arrangement thereof is well known in the art.

It is, of course, to be understood that the present invention is, by no means, limited to the particular showing in the drawing, but also comprises any modifications within the scope of the appended claims.

What we claim is:

1. A Diesel pile driver exclusively for operation with the principle of impact atomization of fuel supplied in unatomized condition at low pressure, which includes: cylinder means, an impact member guided in said cylinder means, and having an impact area, a piston having an impact surface and being reciprocable in said cylinder means and also being operable to have its impact surface impact upon said impact area of said impact member having a face surface upon which unatomized fuel is applied by pump dosage for resulting in atomizing fuel conveyed to the impact area of said impact member, said impact surface of said piston and said impact area of said impact member respectively forming entirely flat plane surfaces substantially parallel to each other.

2. A pile driver according to claim 1, which includes: a metering pump associated with said cylinder means, and control lever means operable by said piston for controlling said pump, said cylinder means being provided with conduit means communicating with said pump and having its axis inclined toward the axis of said cylinder means so that the point of intersection of the axis of said conduit means with said impact area will in the innermost position of said impact member in said cylinder means be offset in a direction radially outwardly of the axis of said impact member.

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