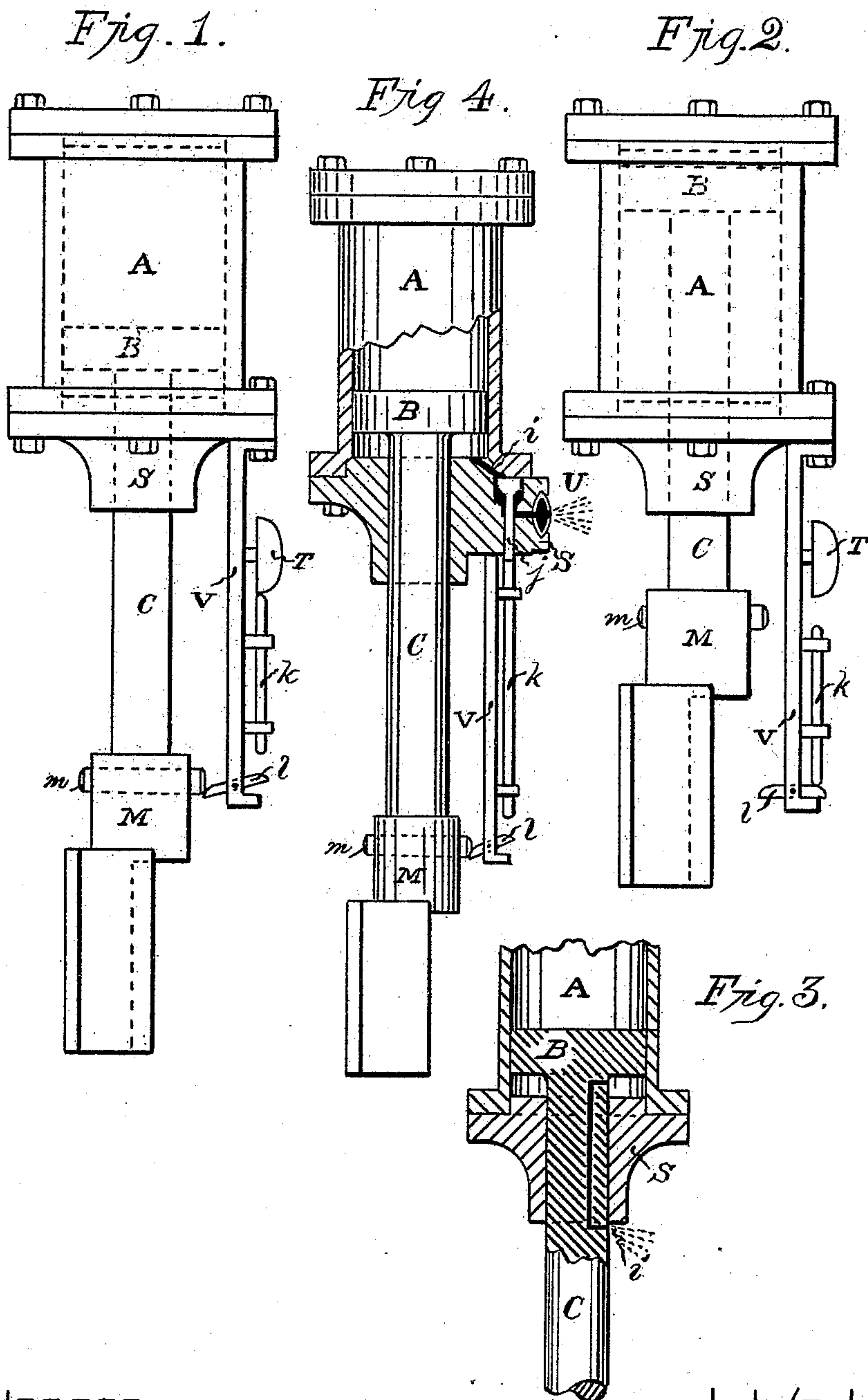


(No Model.)

A. BALL.
ENGINE.

No. 424,450.

Patented Apr. 1, 1890.



WITNESSES

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ENGINE.

SPECIFICATION forming part of Letters Patent No. 424,450, dated April 1, 1890.

Application filed August 17, 1889. Serial No. 321,168. (No model.)

To all whom it may concern:

Be it known that I, ALBERT BALL, a resident of Claremont, in the county of Sullivan and State of New Hampshire, have invented certain new and useful Improvements in Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

The object of the invention is to provide means for signaling the contact or the near approach to contact of a piston with the cylinder-head in an engine which, though applicable under a variety of circumstances and to various engines, is primarily designed for use in direct-acting steam-engines such as used for drilling, and is adapted to give warning of the approach of the piston to the cylinder-head as the length of its stroke is increased by an increase in the depth of the bore; and it consists in a signal, substantially as hereinafter described and pointed out.

In the accompanying drawings, Figure 1 is a side elevation of the device, the piston being indicated in dotted lines. Fig. 2 is a similar view, the piston being indicated as in position for the commencement of a stroke. Fig. 3 is a vertical section of a modified detail; and Fig. 4 is a view, partly in section, showing also a modification.

A indicates the cylinder, B the piston, C the piston-rod, and M the cross-head, of an engine, which may in practice be of any suitable form or kind, the cylinder being provided with the usual and necessary ports, as will be readily understood without further illustration.

To the lower cylinder-head S is secured a pendent bracket V, to which is secured a bell T, arranged in the present instance in the path of a rod K, normally resting on a trip-lever l, fulcrumed on a pin or bolt secured to the bracket. This rod K is supported in a vertical line by guides attached to the bracket in such manner that it may freely move up through apertures in said guides when struck by the outer end of lever l, and by which blow it will be caused to impinge on the bell and it will then descend by gravity to its normal position, thus acting as a bell-hammer.

The lever l is operated to sound the bell or

gong by the cross-head M, or by a projection such as indicated at m, the bell bar and lever being arranged substantially as indicated, so that a projection from the cross-head may strike one end of the lever and cause it to descend. Its sudden descent, as before stated, will elevate the opposite end and throw the bar or hammer k against the bell to cause it to sound an alarm, which alarm under the arrangement shown will be given at the time the piston is approaching the lower cylinder-head and is in the position indicated in Fig. 1.

The device is adapted under suitable arrangement and proportion of parts to give notice of the approach of the piston to any predetermined plane in the cylinder, and it is especially useful in cases where the piston is liable to pound the cylinder-head at the end of an undetermined number of strokes, and gives notice so that the engine or the tool can be readjusted for continuing work without danger of impact of the piston upon the cylinder-head.

In Fig. 4 is represented a valve J, adapted to be raised and open a passage for steam to escape from the cylinder through port i to the whistle U. This valve is opened by means similar to those employed for sounding the bell.

As illustrated in Fig. 3, the steam-conduit i, leading from the cylinder, passes through a portion of the piston-rod, and has an exit or port so arranged that it will be uncovered and permit steam to escape as the piston approaches the cylinder-head. The gist of the present invention does not consist in the particular location and form of the projection m, lever l, rod k, or signaling device or sounder T or U, as it is obvious that the details of construction may readily be varied and yet provide an audible or visible signal that shall be operated by the engine to indicate the approach of the piston to the cylinder-head at the end of a stroke, and the invention covers devices operating in substantially the same way and for a like purpose, though modified in unessential particulars by mechanical skill.

Having thus described my invention, what I desire to secure by Letters Patent, is as follows:

1. In an engine, the combination of a pis-

ton, a signaling device, and means for operating the signal at a predetermined point in the path of the piston, substantially as described.

- 5 2. In an engine, a signaling device, in combination with a moving part of the engine arranged to give notice of a predetermined length of piston-stroke, substantially as described.

- 10 3. In an engine, the combination of a sounding device, a rod or hammer to cause the sound, and the piston, the rod being movable by the piston, substantially as described.

4. In an engine driven, the combination of

a piston, a pivoted lever having one end arranged in the path of a projection from the 15 piston or cross-head and the other normally in contact with a movable rod, and a signaling device operative by means of the rod, substantially as described.

In testimony whereof I have signed this 20 specification in the presence of two subscribing witnesses.

ALBERT BALL.

Witnesses:

FRANK A. BALL,

ARTHUR I. GOODELL.