

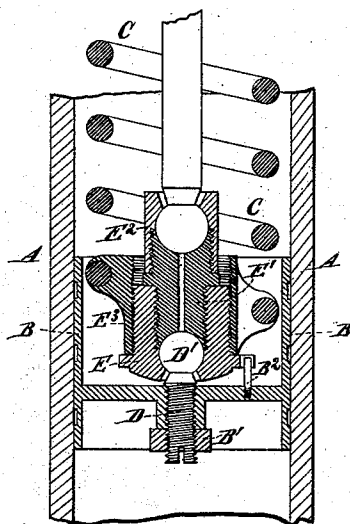
(No Model.)

L. F. LYNE.

Piston Connection for Indicators and Pressure Gages.

No. 235,791.

Patented Dec. 21, 1880.



WITNESSES—

Charles R. Searle,
Charles C. Stetson.

INVENTOR—

Louis F. Lyne,
by his attorney,
R. Stetson

UNITED STATES PATENT OFFICE.

LEWIS F. LYNE, OF JERSEY CITY, NEW JERSEY.

PISTON-CONNECTION FOR INDICATORS AND PRESSURE-GAGES.

SPECIFICATION forming part of Letters Patent No. 235,791, dated December 21, 1880.

Application filed August 26, 1880. (No model.)

To all whom it may concern:

Be it known that I, LEWIS F. LYNE, a citizen of the United States, residing in Jersey City, county of Hudson, and State of New Jersey, have invented certain new and useful Improvements relating to Steam-Engine Indicators, of which the following is a specification.

By the term "indicators" I include any of the forms of device in which a piston is subjected in a small cylinder to the influence of a spring, and to the action of the steam or vacuum, as the case may be, at one end of the cylinder, for the purpose of moving a pencil or other marking device under the influence of the steam and spring, to indicate the pressure in that end of the cylinder at different parts of the stroke. It is usual to mount this in connection with a device for moving a sheet of paper backward and forward with a motion coincident to that of the main piston, and thus to secure an irregularly-marked figure, known as a "diagram," which is important in indicating whether the valves of the engine are correctly adjusted.

I have discovered that in the ordinary indicators with the rigid connection of the spring to the piston, there is a tendency to tilt the piston in one direction or the other as the spring is much compressed or stretched. This is due to laws relating to the action of coiled springs, which it may not be necessary to investigate. The result is, that when the piston stands perfectly true in the cylinder, when the spring is easy, a considerable elongation of the spring by a vacuum in the cylinder, or, still more, a great compression of the spring by a high pressure of fluid in the cylinder, tends so strongly to rock or incline the piston as to induce serious frictional resistance to the motion. I have devised a simple remedy. I make a universal joint between the casting to which the spring is connected and the piston. I mount this in the interior of the piston. No additional space is required. I make the joint at the mid-height of the piston, so the action is uniform in both directions. I obtain a very simple construction by means of a ball-joint.

The accompanying drawing forms a part of this specification, and represents what I con-

sider the best means of carrying out the invention. The drawing represents the novel parts with so much of the ordinary parts as is necessary to indicate their relations thereto. The drawing is a central vertical section through the piston and the means by which the spring is attached thereto.

Referring to the figure and to the letters of reference marked thereon, A is the cylinder of the indicator, B the main body of the piston, and C an ordinary spiral spring of steel wire tempered, or other suitable material.

I provide a separate casting, E, finished on its interior to fit tightly and easily to the ball D', with a sufficient aperture in the bottom to allow the easy passage of the screw-threaded portion D, projecting below. Having dropped the pin D D' into the casting E, I screw down upon it a tight-fitting plug, E', accurately hollowed on its under side, so that when it is properly adjusted it allows a free movement upon the polished sphere D'. I use a slot in the lower end of the pin D D' as a means for operating the pin D by inserting a small screw-driver to screw it down to its proper place in the piston. Next the pin D is firmly locked by setting up on the jam-nut B'. Lastly, the screw-plug E' is screwed down firmly to a shoulder, allowing the casting E to tilt freely on the head D'.

The exterior of the casting E is screw-threaded, and receives a corresponding threaded thimble, E³, which is equipped with the ordinary projections, by which the spring C is engaged and firmly united thereto, by soldering or otherwise, in the ordinary manner. As a result, the spring is strongly engaged, and performs as usual, but with freedom to rock itself and its connected casting E in any direction the exigencies may require without any appreciable tendency to disturb the vertical position of the piston B. The neck of the pin D need not be much contracted to allow all the rocking which is ever required in practice. The spring exerts its tension and yields in one direction or the other, as required by the widely-varying pressure of the steam under the piston, with the effect to act directly upward or downward on the piston, and without any other influence.

B² is a pin inserted in the body of the piston and received loosely in a hole in the casting E. It serves to prevent the casting from being turned around when the spring C is put on or taken off. The proper connection for operating the pencil-lever (not shown) is formed by extending upward the head of the screw-plug E' and applying a properly-formed cap or nut, E², thereon, as indicated in the figure.

10 All these parts of the piston, and generally all of the mechanism not represented, may be the same as is set forth in the patent to H. Tabor December 10, 1878, No. 210,643.

The invention is more important on an indicator having a short spring; but it may be used with advantage on all indicators working with a piston and having a spring connected in any manner, so that the action of the spring or of the connected parts is liable to incline the piston from its proper position in line with the cylinder.

Modifications may be made in the forms and proportions.

I have made a provision for lubricating the ball-joint by drilling a small hole directly through the plug E', so that oil supplied to the upper joint will also find its way to the sphere D'.

Other means of applying and securing the parts may be adopted.

I claim as my invention—

1. As an improvement in steam-engine indicators and analogous pressure-gages, the combination of a cylinder, a piston, a tensile

and contractile spring, and a flexible joint connecting the spring to the piston, so that the spring may accommodate itself by rocking at its point of attachment without tendency to rock the piston, substantially as herein specified.

2. As a piston-connection for indicators, the ball-joint D' E E', in combination with the stop or pin B², adapted to allow the spring C and the connected parts to rock on the universal joint thus formed without liberty to turn horizontally, as herein specified.

3. In combination with the ball-joint D' E E', the threaded extension of the screw-plug E' in the opposite direction, and the threaded cap E², embracing a ball on a connection to the pencil-operating mechanism, all arranged for joint operation, as herein specified.

4. In a steam-engine indicator, the deep hollow piston B, threaded pin D, ball D', and nut B', in combination with the casting E, pin or stop B², screw-plug E', cap E², spring C, and thimble E³, adapted to serve relatively to each other and to the cylinder A and a ball-connection to the pencil mechanism substantially as herein set forth.

In testimony whereof I have hereunto set my hand, at New York city, N. Y., this 25th day of August, 1880, in the presence of two subscribing witnesses.

LEWIS F. LYNE.

Witnesses:

EDWD. CRUPLOW,
ERWIN W. THOMPSON.