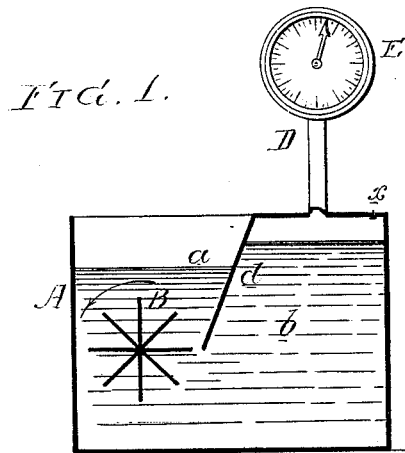
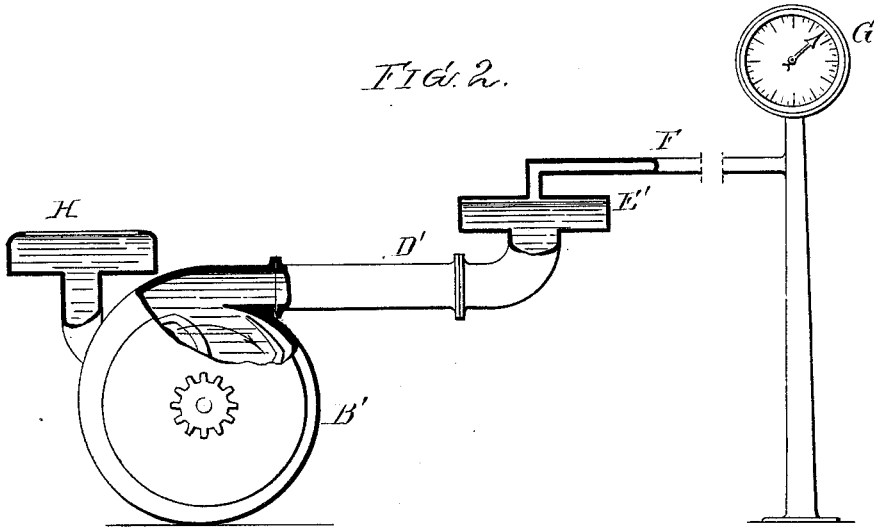


G. W. STORER.
Speed-Indicators for Shafts.

No. 213,467.

Patented Mar. 18, 1879.



Witnesses
Harry A. Crawford,
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Inventor
George W. Storer
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UNITED STATES PATENT OFFICE.

GEORGE W. STORER, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN SPEED-INDICATORS FOR SHAFTS.

Specification forming part of Letters Patent No. **213,467**, dated March 18, 1879; application filed January 7, 1878.

To all whom it may concern:

Be it known that I, GEORGE W. STORER, of Philadelphia, Pennsylvania, have invented a new and useful Improvement in Speed-Indicators for Shafts, of which the following is a specification:

My invention relates to an improvement, fully described hereinafter, in that class of speed-indicators in which water or other liquid is displaced in a chamber by the action of a rotating paddle-wheel, and caused to act on a gage, an early example of such indicators being shown and described in the English Patent No. 1,248 of 1862.

The object of my invention is to so combine an air-chamber with an indicator of this class that the water or other liquid displaced by the paddle-wheel will act on the gage through the medium of a body of air, thereby enabling me to place one or more gages in any desired position in respect to the paddle-wheel and supply of liquid.

One of the simplest modes of carrying my invention into effect is illustrated in the sectional diagram, Fig. 1, of the accompanying drawings, in which A is a box, separated into two compartments, *a* and *b*, by a partition, *d*, below the lower edge of which the compartments communicate with each other.

In the compartment *a* is a paddle-wheel, B, driven in the direction of the arrow by the shaft, the speed of which has to be indicated. The compartment *b* communicates through a pipe, D, with a delicate gage, E.

As long as the paddle-wheel remains stationary the water in the two compartments will be quiescent and at the same level; but on turning the paddle-wheel B in the direction of the arrow more or less of the water in the compartment *a* will be displaced and find its way into the compartment *b*, and the air in the latter will consequently be compressed.

It is essential to my invention that there should be an air-chamber between the gage and the supply of water, for on this depends the possibility of arranging the gage in any desired position.

The greater the speed of the paddle-wheel the higher will the water rise in the compart-

ment *b*, and any diminution in the speed of the wheel will be followed by the return of more or less of the water from the compartment *b* to the compartment *a*.

There should be a small valve, *x*, opening inward on top of the compartment *b*, so that when the water sinks in the latter air may have free access to it, the valve closing the moment the water rises in the said compartment.

The gage being properly graduated, its pointer will indicate the speed of the wheel B, and consequently of any shaft which drives the wheel, the movement of the pointer being due to the fluctuation of the water in the compartment *b* and the water acting on the gage through the medium of air.

The device for displacing the water in the compartment *a* must be such as to permit the free return of the water to the compartment when there is a diminution in the speed of the displacing device. For instance, a positive force or lift pump will not serve the purpose, as it will not permit the return of the water.

A centrifugal pump, such as that shown in the aforesaid English patent, and having vanes less than the casing in which they revolve, is best adapted to my improvement.

In Fig. 2, B' is a pump of this class, and is driven by the engine, the speed of which has to be indicated. The outlet-pipe D' of this pump communicates with an air-chamber, E', and the latter, through a pipe, F, with a gage, G.

There is a reservoir, H, communicating with the interior of the casing of the rotary pump at the center of the same, the water in this reservoir being about level with the bottom of the air-chamber E' when the pump is stationary.

When the vanes of the pump are turned in the direction of the arrow, more or less of the water in the casing will find its way into the air-chamber E', according to the speed of the vanes, and this air, under the influence of the water, will act on the gage, the pointer of which indicates the speed of the engine which drives the rotary pump.

I prefer the arrangement shown in Fig. 2

for use on board steam-vessels for indicating the speed of the engine, the gage being situated in the cabin of the chief engineer; or there may be two or three gages situated at such different points as may be desirable.

I am aware that water displaced by centrifugal action due to the rotation of a vaned wheel in a chamber has been caused to act on a gage for indicating the speed of engines and shafts; and I am also aware that prior to my invention water under pressure has been caused to act on a gage through the medium of a volume of air. I therefore disclaim these features separately considered; but

I claim as my invention—

A speed-indicator in which are combined the

following elements, namely: first, a chamber containing a supply of water or other appropriate liquid; second, a device for displacing the water in the chamber to an extent determined by the speed of the engine or shaft which drives the device; third, a gage or gages; and, fourth, an air-chamber intervening between the water-chamber and the gage or gages, all as set forth.

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

GEORGE W. STORER.

Witnesses:

HARRY A. CRAWFORD,

HARRY SMITH.