No. 632,942. Patented Sept. 12, 1899.

E. HERVAIS.

PRESSURE OR VACUUM GAGE.

(Application filed Dec. 10, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 6

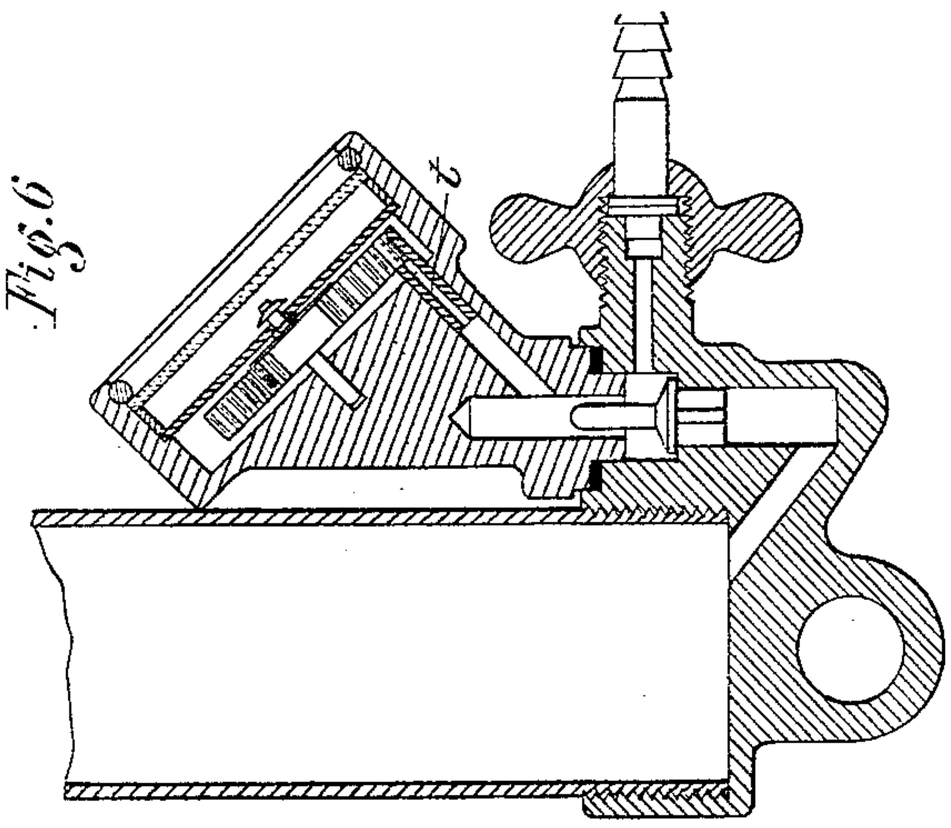


Fig. 5

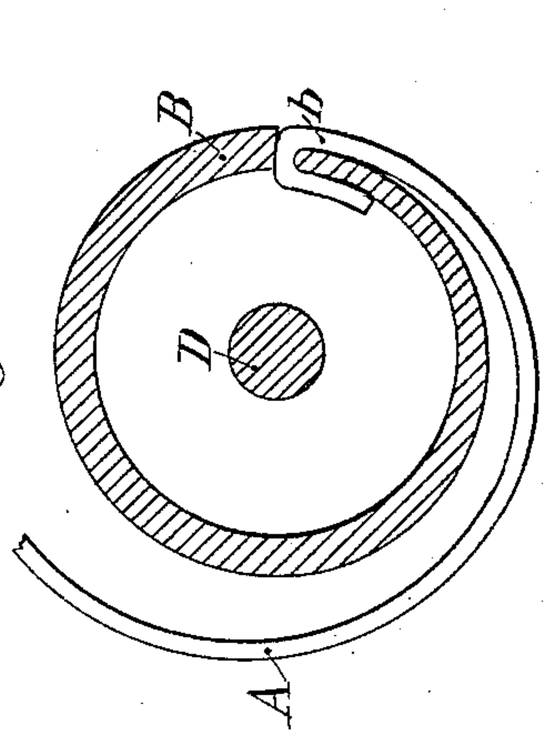


Fig. 4

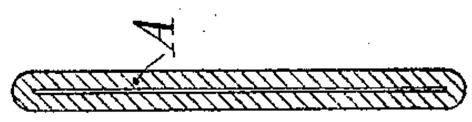


Fig. 3

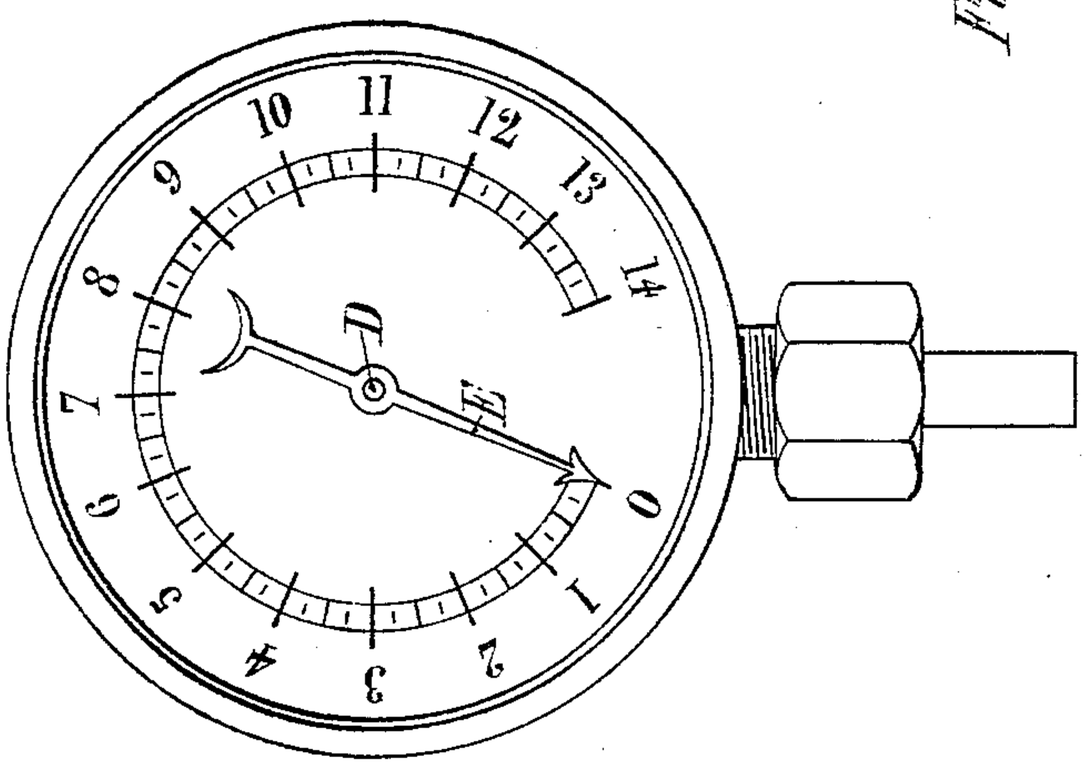


Fig. 1

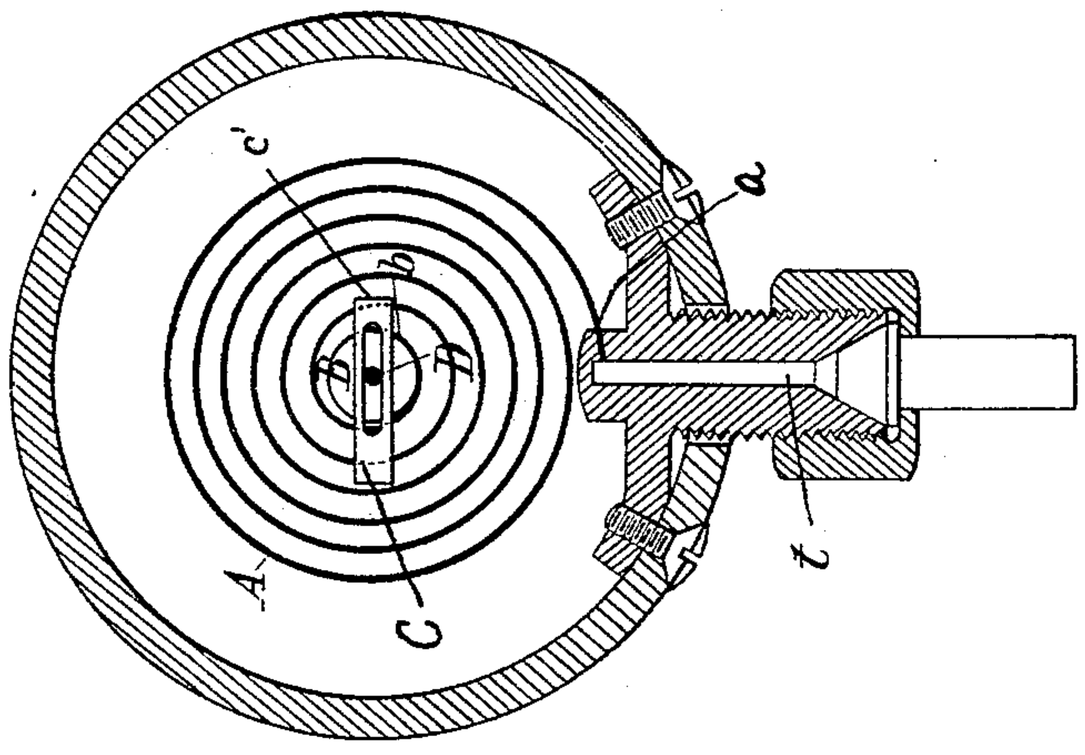
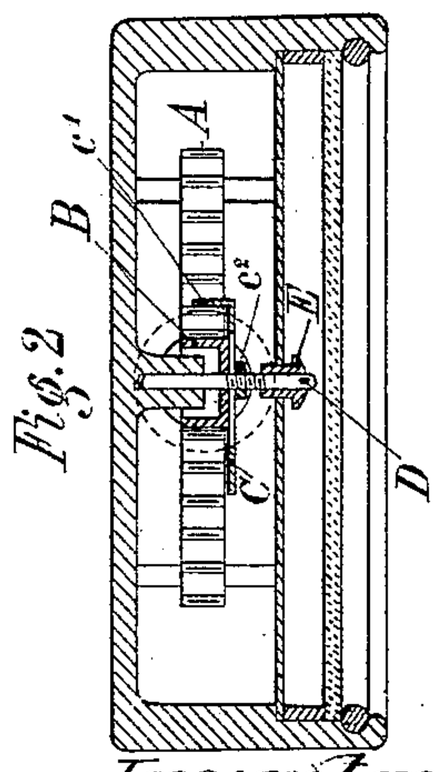


Fig. 2



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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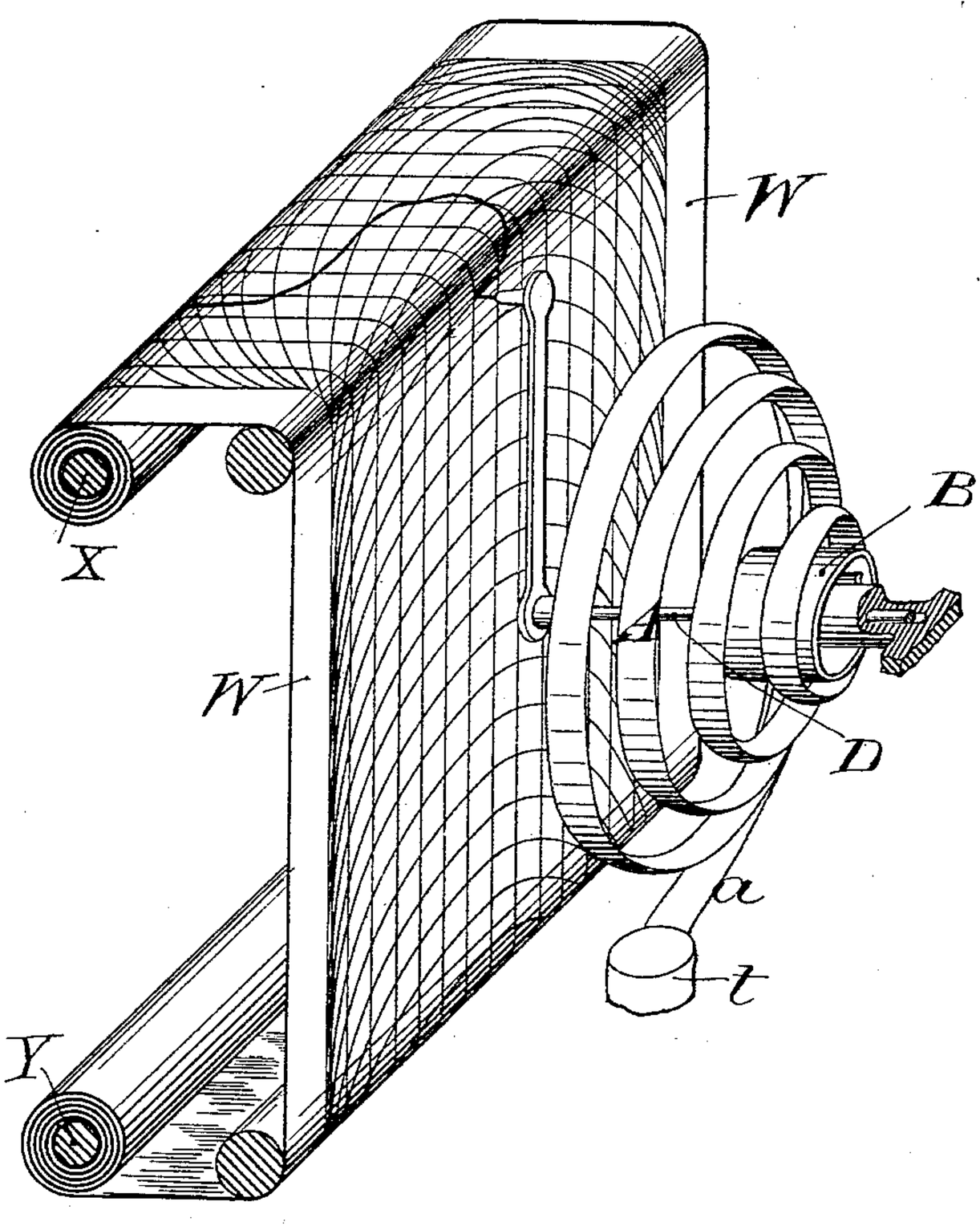
(No Model.) 2 Sheets—Sheet 2.

Fig. 7.



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UNITED STATES PATENT OFFICE.

EMILE HERVAIS, OF PARIS, FRANCE.

PRESSURE OR VACUUM GAGE.

SPECIFICATION forming part of Letters Patent No. 632,942, dated September 12, 1899.

Application filed December 10, 1898. Serial No. 698,802. (No model.)

To all whom it may concern:

Be it known that I, EMILE HERVAIS, engineer, a citizen of the Republic of France, and a resident of 9 Rue St. Sébastien, Paris, France, have invented new and useful Improvements in Gages for Indicating and Registering Pressure or Vacuum, of which the following is a specification.

This invention relates to pressure and vacuum gages of the class known as "Bourdon," in which a metal tube in a flattened condition is wound upon itself in such a manner as to form an elastic spiral, either plane or conical, having several convolutions, the said tube being placed in communication by means of its external extremity, which is fixed, with the vessel or the like the pressure existing in which it is desired to measure, and the other extremity of the tube, which is movable, being attached directly to the axis of oscillation of the indicating-needle or registering-stylus in such a manner as to actuate it when the spiral becomes wound or unwound owing to the variations of pressure within the tube.

My improvement consists in the means hereinafter described and claimed for adjusting the relation between the said tube, the indicating-needle or registering-stylus, and the dial to produce a correct indication or registration.

Figure 1 of the drawings is a vertical section of a pressure-gage embodying my invention. Fig. 2 is a horizontal section of same through Fig. 1. Fig. 3 is a front view of same. Fig. 4 is an enlarged view intended to more clearly show the shape of the flattened tube in cross-section. Fig. 5 shows the mode of securing the tube to the central socket, which is fixed to the axis of the indicating-needle. Fig. 6 illustrates the application of my pressure-gage to a pump for inflating pneumatic wheel-tires. Fig. 7 is a perspective view illustrating a modification of my invention.

In carrying my invention into practice as illustrated by Figs. 1 to 6 the external extremity of the completely-flattened metal tube A, wound in a spiral, is attached to the tube *t* for the supply of the fluid the pressure of which it is desired to measure. The other extremity *b* of the flattened tube is fixed to a socket B, carried by the arbor D of the indicating-needle E.

The dial may be marked in the usual manner by employing a standard pressure-gage. If, however, in the case of a dial which has been marked beforehand, the divisions do not correspond to the displacements of the needle, these latter may be readily modified in such a manner as to cause them to conform to the indications upon the dial. For this purpose I employ a slide C, which consists of a metallic blade provided with a groove for the passage of the axis D of the needle and bent down at its end *c'*. By turning such slide C around while it freely slides its end *c'* can be brought close to any desired point of the spiral A, after which it is fixed in position on the socket B by means of the nut c^2.

As the only portion of the spiral which is comprised between the points *a* and *c'* acts to displace the needle, it is obvious that you have but to change the position of the slide to make different the angular displacement of the needle for a given change in the pressure it is desired to measure. It will thus be seen that the adjustment of the apparatus is extremely simple.

This form of pressure-gage being free from any transmission part between the tube A and the needle may be employed and have a long life in many cases in which an ordinary pressure-gage would not stand, either owing to its being submitted to shocks or exposed to humidity or to emanations, which would modify the articulations and delicate parts.

As an example of the applications of my pressure-gage I will cite its adaptation to a pump for the inflation of pnematic tires. (See Fig. 6.)

The arrangement described is applicable not only for the construction of pressure-gages, but also for the construction of vacuum-indicators. In this case the tube is not completely flattened. A small space is left between its walls in order to enable the atmospheric pressure exerted externally to produce the deformation of the section of the tube.

In the modification of my invention illustrated by Fig. 7 for registering pressure or vacuum an index I, carrying a pencil *i*, is substituted for the indicating-needle E and a web W of ruled paper is substituted for the dial, the said web being carried by rollers X Y, to

which are to be applied suitable mechanism for moving them and the paper at a properly-timed speed. In this modification the flattened tube is wound in a conical or flat spiral, thus forming a path of considerable length with a very small volume and weight. It is especially applicable for dynamometric indicators intended for tracing diagrams. Indicators thus formed are free from the defects of ordinary indicators arising from the inertia and friction of the pistons.

What I claim as my invention, and desire to secure by Letters Patent, is—

In a gage for indicating or registering pressure or vacuum of the class herein described, a slide provided at its end with a projection which can be brought in contact with any desired point of the length of the spiral tube, for the adjustment of the gage, substantially as herein set forth.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 28th day of November, 1898.

EMILE HERVAIS.

Witnesses:

EDWARD P. MACLEAN,

ALCIDE FABE.