

E. S. COLE.
RECORDING DEVICE.
APPLICATION FILED MAY 8, 1909.

1,053,085.

Patented Feb. 11, 1913.

Fig. 1.

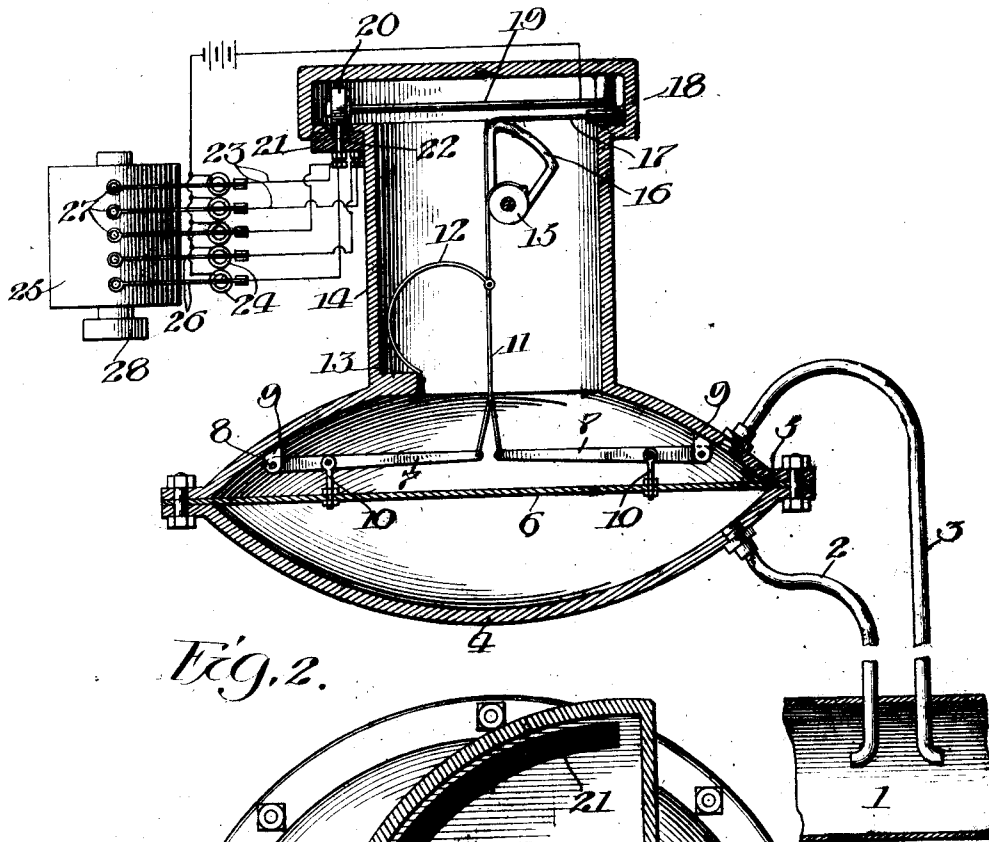
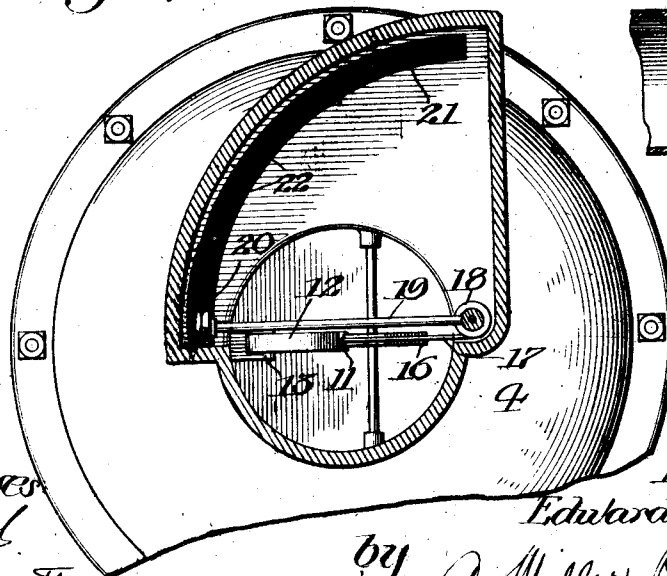


Fig. 2.



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RECORDING DEVICE.

1,053,085.

Specification of Letters Patent.

Patented Feb. 11, 1913.

Application filed May 8, 1909. Serial No. 494,751.

To all whom it may concern:

Be it known that I, EDWARD S. COLE, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new and useful Improvement in Recording Devices, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to hydraulic recorders,—that is to say, to devices for recording the velocity and static pressure of flowing streams.

The objects of the invention are to provide a simple, practical and inexpensive device of the class specified, to obtain accuracy of record, simplicity of operation, efficiency, durability, adaptability, and other desirable results as will be hereinafter more particularly set forth.

In the accompanying drawing Figure 1 represents a recording device embodying my invention, said device being shown partly in vertically section and partly in diagram; Fig. 2 is a view of said recording device partially in plan and partially in horizontal section, with a part of the structure broken away for convenience of illustration.

Referring to the drawing, I have shown a pipe 1, which may be a water main or any other pipe or conduit carrying liquid whose velocity it is desired to measure. This pipe, or conduit, 1, is provided with Pitot tubes 2 and 3, the former facing down stream and the latter up stream. These tubes 2 and 3 are extended to a metallic casing 4 containing a flexible diaphragm 5 carrying a metal disk 6. The tubes 2 and 3 communicate with the interior of the casing 4 on opposite sides of the diaphragm 5, the tube 2 being below the diaphragm and the tube 3 above it. Levers 7, pivoted at 8 upon arms 9 carried by the casing 4, are arranged lengthwise above the diaphragm 5, and connected with the metal disk 6, and there by rods 10. At the inner ends of the lever 7, flexible connectors 11, 11, extend up to the free end of a spring 12, supported by a block 13 on the side of a case 14, mounted upon and connected with the upper chamber of the casing 4. The flexible connectors 11

are extended up over a pulley 15, also mounted on the casing 14 and carrying a parabolic gear, or member 16. A flexible connector 17 extends from the end of this gear 16 to a pulley 18, having an arm 19 upon which is mounted a metal wheel 20. The wheel 20 travels upon a hard rubber board or block 21, forming a segmental track 21, having a series of contacts 22. This track 21 is at an opening formed in the casing 14, so that while all the parts heretofore referred to are inside of the casings 4 and 14, the track 21 is outside of the same, except its inner face or surface, upon which are arranged the contacts 22. Conductors 23, 23 are extended from the contacts 22, 22, to magnets 24, arranged alongside a recording cylinder 25, and arms 26 are extended from the magnets 24 to the cylinder or drum 25, and provided with recording pencils or pens capable of forming a record upon a record sheet on the cylinder 25. The latter is driven by clock-work 28.

In operation, the velocity of the flowing stream causes the pressure transmitted through the tube 3 to act upon the diaphragm 5, thereby depressing the same and causing the lever mechanism to draw down upon the spring 12 and turn the wheel or pulley 15. This in turn causes the gear 16 to bring about a turning action of the pulley 18, which in turn swings the arm 19, and causes the wheel 20 to travel over the contacts 22. When this is done, circuits are closed, the magnets 24 thereby causing the recording devices 27 to act upon the record sheet on the drum 25 to form a record.

The device herein shown is exemplary of a type of device which can be much modified and varied, and I am showing it in the precise form here illustrated merely to illustrate its general principles of construction and operation.

The general features of construction and operation of the device permit accuracy, sensitiveness and reliability to be obtained. There is no friction with consequent elimination of errors from that source; and no trouble from changes of temperature, photography, etc.

The use of a parabolic gear, or like element in the train of mechanism, corrects the reading so as to compensate for decreased movement of the diaphragm pro

rata as the velocity pressure increases. This same result can, if desired, be obtained by spacing the pencil magnets at decreasing distances, as shown and claimed in my Patent No. 880,720, in which case the parabolic element will be omitted.

As a matter of further improvement, I desirably arrange to have the casings 4 and 14 filled with water under pressure from the main.

It will be understood that changes and modifications may be made without departing from the spirit of the invention.

What I claim is:—

1. In a device of the class described in combination, a casing, a diaphragm mounted in said casing, a pair of levers pivoted to said casing and also to said diaphragm, an arm having a hub pivoted within said casing, a flexible member directly connecting said levers and said hub for rotating said lever, a correcting member over which said flexible member passes, and a spring for tensioning said flexible member.
2. In a device of the class described in combination, a casing having a horizontal diaphragm therein, a lever pivotally connected to said diaphragm and to said casing, an arm mounted within said casing to rotate in a horizontal plane, mechanism for transmitting the motion of said lever to said arm for rotating said arm, a roller carried on said arm, a set of electrical contacts mounted in a horizontal plane, over which said roller travels, and a recording device exterior to said casing governed by the movements of said arm and roller.
3. In a device of the class described in combination, a casing having a diaphragm chamber and a chamber connected with said diaphragm chamber provided with an outstanding horizontal wall, a series of electric contacts mounted upon said horizontal wall, a diaphragm mounted in said casing, a horizontal arm pivoted in said casing for co-operating with said contacts, means for bending said diaphragm, and mechanism for transmitting the movements of said diaphragm to said arm.
4. A device of the class specified comprising a casing containing a diaphragm, tubes communicating with the interior of said casing on opposite sides of said diaphragm, a train of mechanism actuated by said diaphragm, a rolling contact-maker actuated by said train of mechanism, a series of electrical circuits arranged to be closed by said rolling contact-maker, electro-magnets included in said circuits, recording pencils actuated by said electro-magnets, and a rotary drum with clock-work for holding a record to be acted upon by said pencils.
5. A device of the class specified comprising a casing containing a diaphragm, a train of mechanism actuated thereby, a rolling

electrical circuit-closing device actuated by said train of mechanism, a series of electrical circuits adapted to be closed by said rolling device, electro-magnets included in said circuits, recording devices actuated by said magnets, and a record sheet-holding device arranged to coöperate with said recording device.

6. A device of the class specified comprising a casing containing a diaphragm, tubes connected with said casing, levers connected with the diaphragm, a spring connected with said levers, a gear connected with said spring, a drum carrying a swinging arm connected with said gear, a series of electrical contacts governed by said arm, electro-magnets in circuits containing said contacts, and recording pencils actuated by said magnets.

7. A recording device comprising a casing containing a flexible diaphragm, and a train of mechanism actuated by said diaphragm, including a spring and a parabolic gear or pulley 16, a string passing over said pulley and attached to the diaphragm whereby the pulley is operated by movement of said diaphragm, said mechanism also including a swinging arm carrying a pulley traveling over a series of contacts, a series of electro-magnets whose circuits are closed at the movement of said pulley, a rotary drum, and recording devices associated with said drum and arranged to be operated by said electro-magnets.

8. In a device of the character described the combination with a flexible member, means for communicating the static and velocity pressure to opposite sides of said member, and means for recording the movements or flexure of said member.

9. In a device of the class described, the combination with a flexible member, means for flexing the same by variations in the velocity of a flowing stream and means for recording the movements or flexures of said member.

10. A device of the class described, comprising a casing containing a diaphragm, means for varying the pressure on opposite sides of said diaphragm, a rolling contact maker actuated by the diaphragm, a series of electrical connections controlled by said contact maker, a series of electro-magnetic devices connected with said connections, a series of recording devices actuated by said electrical devices, and a record holding device for holding a record to be acted upon by said recording devices.

11. In a pressure recorder in combination, a casing, a diaphragm in said casing, tubes connected to said casing on opposite sides of said diaphragm, an arm pivoted to said casing, and mechanism comprising a pivoted link interposed between said diaphragm and said arm.

12. A device of the class described, comprising a casing, a diaphragm, a lever pivoted to said casing and connected to said diaphragm, an arm and a string connected
5 to said lever and said arm.

13. A device of the class described, comprising a casing, a diaphragm, a lever pivoted to said casing and connected to said diaphragm, an arm, a string connecting said
10 lever and said arm, and means for tensioning said flexible member.

14. A device of the class described, comprising a casing, a diaphragm, a lever pivoted to said casing and connected to said
15 diaphragm, an arm, a flexible member connected to said lever and said arm, and a correcting member cooperating with said flexi-

ble member for correcting the variable movement of the diaphragm.

15. A device of the class described, com- 20
prising a casing, a diaphragm, a lever pivoted to said casing and connected to said diaphragm, an arm, a flexible member connecting said lever and said arm, and a correcting member cooperating with said flexi- 25
ble member, said correcting member having a parabolic surface.

In witness whereof, I hereunto subscribe my name this 8th day of April A. D., 1909.

EDWARD S. COLE.

Witnesses:

O. M. NERMICK,
JEAN ELLIOTT.