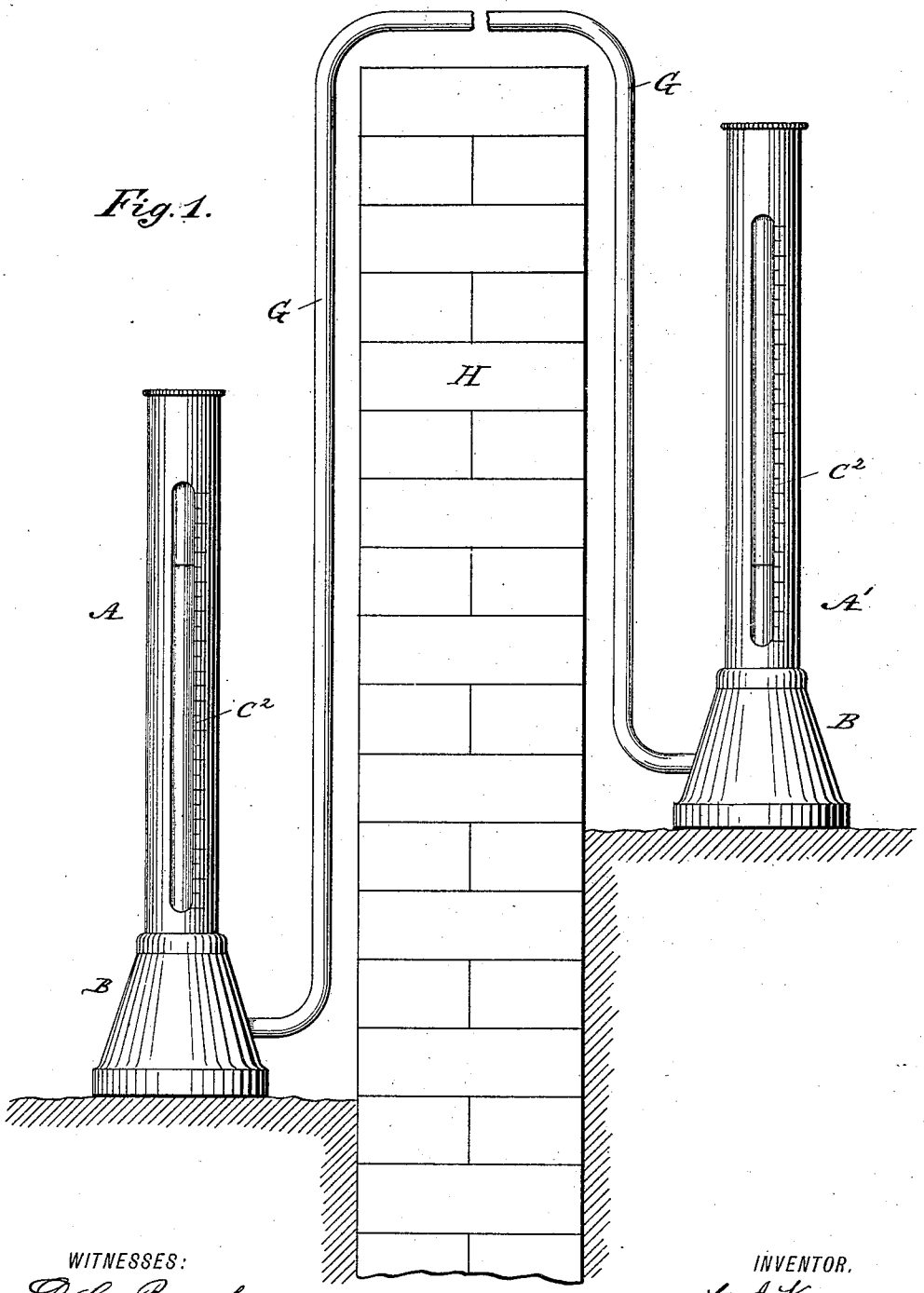
(No Model.) 3 Sheets—Sheet 1.

C. A. KARR.

LEVELING INSTRUMENT.

No. 397,294. Patented Feb. 5, 1889.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 6.

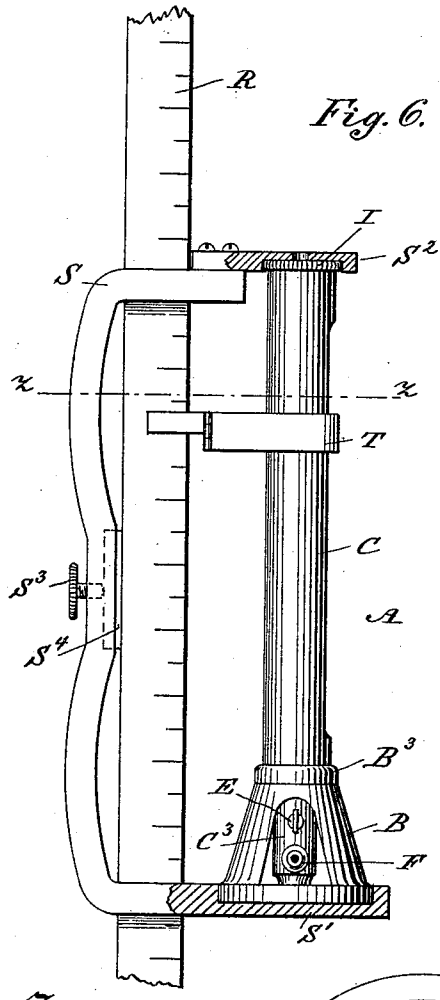

Fig. 8.

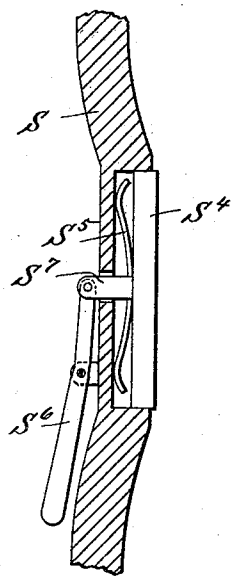

Fig. 7.

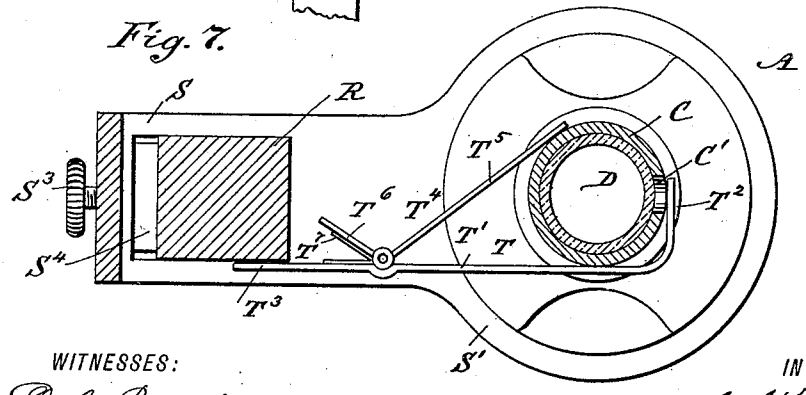

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Fig. 3.

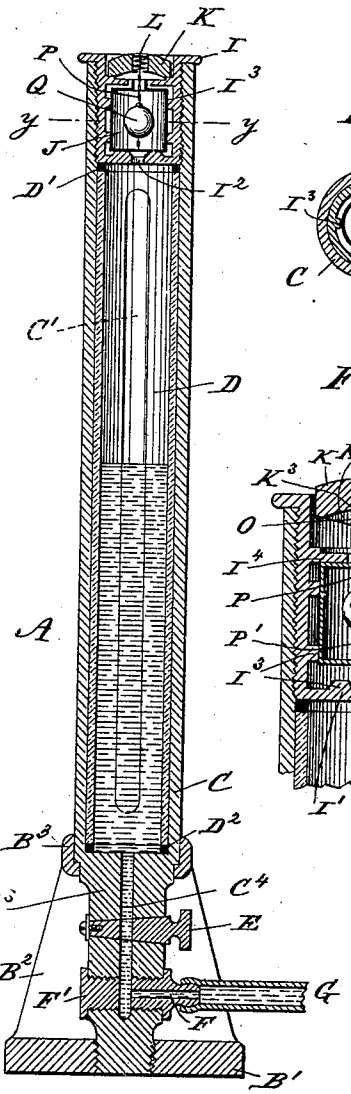


Fig. 4.

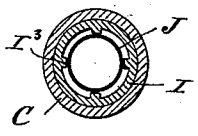


Fig. 5.

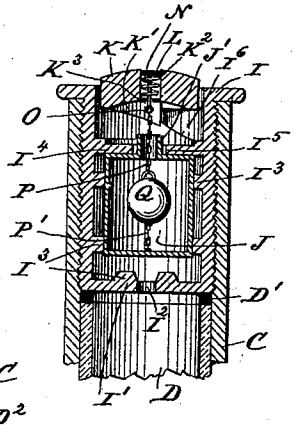
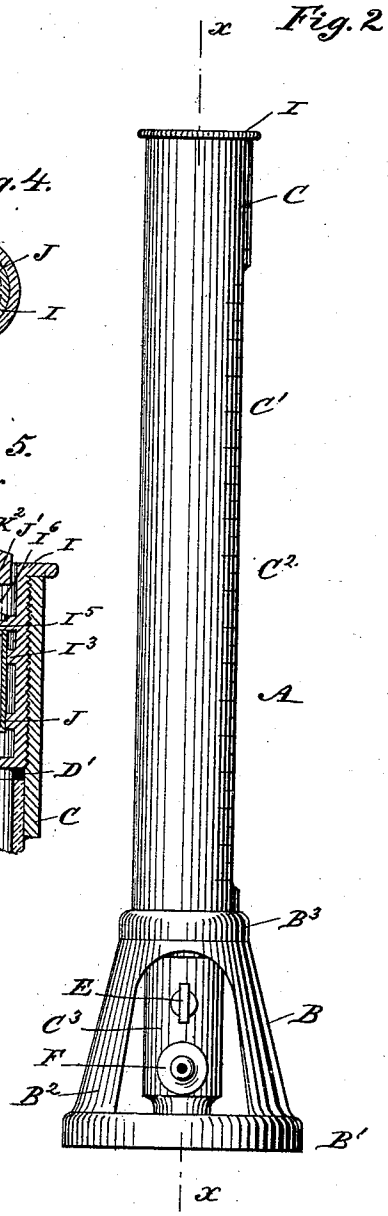


Fig. 2.



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UNITED STATES PATENT OFFICE.

CHARLES ALLEN KARR, OF GREEN ELM, KANSAS.

LEVELING-INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 397,294, dated February 5, 1889.

Application filed June 4, 1888. Serial No. 275,983. (No model.)

To all whom it may concern:

Be it known that I, CHARLES ALLEN KARR, of Green Elm, in the county of Crawford and State of Kansas, have invented a new and Improved Hydrostatic Leveling-Instrument, of which the following is a full, clear, and exact description.

The invention relates to hydrostatic leveling-instruments, such as shown and described in Letters Patent No. 375,450, granted to me December 27, 1887.

The object of the present invention is to provide an improved hydrostatic leveling-instrument which is simple and durable in construction, compact in form, and easily adapted for the whole range of work for which such instruments are used.

The invention consists of certain parts and details and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the improvement as applied. Fig. 2 is an enlarged end elevation of one of the standards. Fig. 3 is a side elevation of the same on the line *x x* of Fig. 2. Fig. 4 is a sectional plan view of the same on the line *y y* of Fig. 3, the ball being removed. Fig. 5 is an enlarged sectional side elevation of the upper end of one standard. Fig. 6 is an end elevation of one standard as applied to a leveling-rod. Fig. 7 is an enlarged sectional plan view of the same on the line *z z* of Fig. 6, and Fig. 8 is an enlarged sectional end elevation of a modified form of clamp for attaching the standard to the leveling-rod.

The improved instrument is provided with the two standards A A′, alike in construction and operation, so that it suffices to describe one only. The standard A is provided with a base, B, consisting of a bottom, B′, supporting the sides B^2, on the upper ends of which is mounted a flanged ring, B^3, in which is set the tube C, carrying in its interior the glass tube D, in which is placed the liquid used in connection with the standards.

The outer tube, C, is provided in one side with a slot, C′, and on the edges of the slot is formed a graduation, C^2, representing a suitable measurement. The lower reduced end, C^3, of the tube C passes through the ring B^3 and is provided in its middle with a recess, C^4, adapted to be opened and closed by a cock, E, held in the reduced part C^3 of the tube C. The lower end of the recess C^4 connects with an apertured plug, F, screwing in the reduced part C^3, and on the outer end of this plug F is fastened one end of a flexible tube, G, connecting by its other end with the plug F of the standard A, as is plainly shown in Fig. 1. The flexible tube G is passed over the obstruction H between the two standards A and A′. In the reduced end C^3 also screws a plug, F′, leading to the recess C^4 and serving for the purpose of filling the instrument. In order to secure the outer tube, C, firmly to the base B, I fasten the lower end of the reduced part C^3 of the said tube to the bottom B′ either by screwing the lower end into the said bottom or fastening it by other suitable means.

In the upper end of the outer tube, C, screws the cap I, the bottom I′ of which rests on the gasket D′, held on the upper end of the glass tube D. A similar gasket, D^2, is placed at the lower end of the said glass tube D, as is plainly shown in Fig. 3. In the bottom I′ of the cap I is formed an aperture, I^2, and in the interior of the said cap I is formed a number of projections, I^3, on which is fitted to slide vertically a hollow valve, J, preferably cylindrical in form, and provided at its upper end with a cylindrical mouth, J′, passing through an opening, I^5, formed centrally in a cross-plate, I^4, on the cap I.

In the upper open end of the cap I fits loosely a plug, K, provided on its under side near its rim with a spiral projection, K′, fitting into a similarly-shaped offset, I^6, formed on the inside of the cap I. When the plug K is turned, it moves up or down on account of the said spiral projection K′ traveling on the offset I^6, as plainly shown in Fig. 5. In the middle of the plug K is formed an aperture, K^2, in which is held to slide a plate, L, carrying a downwardly-extending rod, O, on which is coiled a spring, N, the upper end of which rests against the under side of the said plate L, its other end resting on the bottom K^3 of the opening K^2.

The rod O extends through the bottom K^3

and is connected with a downwardly-extending chain, P, passing through the mouth J′ of the valve J into the latter, supporting a ball, Q, held inside of the valve J, and connected by a short chain, P′, with the bottom of the valve, so as to sustain said ball Q near the middle in the interior of the said valve. As shown in Fig. 5, the plug K is in its uppermost position, so that the top of the valve J closes the opening I^5 of the cap I. When the plug K is turned and moves downward, the valve J falls by its own weight and opens the aperture I^5, so that air from the outside can pass through the said aperture I^5 and through the cap I and opening I^2 into the closed tube D. If the standard A or A′ is flooded, the valve J will rise and close the opening I^5, so as to prevent the escape of the fluid in the glass tube. If the standard is overturned, the weight of the ball Q, acting on the chains P and P′, draws the valve J outward and also closes the opening I^5, so that the liquid in the glass tube is not spilled.

When it is desirable to fasten the standard to a leveling-rod, R, I employ a clamp, S, such as shown in Figs. 6 and 7. This clamp S is fitted to slide on the rod R, and is provided on its bottom with an arm, S′, having a recess into which fits the bottom B′ of the base B. A similar arm, S^2, is secured to the upper end of the clamp S and fits onto the top end of the cap I, as shown. A central opening is formed in the said arm S^2, so as to admit air in the glass tube D. In the middle of the clamp S is a screw, S^3, bearing against the block S^4, fitting onto the back of the leveling-rod R, so that when the said screw is adjusted the clamp S is firmly attached to the leveling-rod R. By turning back the screw S^3 the clamp S can be moved up and down on the leveling-rod, carrying with it the standard A.

Instead of employing the block S^4 and screw S^3, I may use the arrangement shown in Fig. 8, in which the plate S^4 is pressed against the back of the leveling-rod R by a spring, S^5, held in the clamp S and pressing against the said block S^4. The block S^4 can be withdrawn out of contact with the back of the leveling-rod by a lever, S^6, fulcrumed on the clamp S, pivotally connected with a lug, S^7, projecting from the rear end of the block S^4. When the operator presses on the lower end of the lever S^6, the block S^4 moves out of contact with the back of the leveling-rod R, and the clamp S, with the standard A, can be moved up and down on the leveling-rod to any desired position, and then the operator releases the pressure on the lever S^6, so that the spring S^5 forces the block S^4 into contact with the leveling-rod R, whereby the clamp S is attached at any desired position on the leveling-rod R.

In order to indicate the precise level of the liquid in the tube D on the graduation on the leveling-rod R, I employ a pointer, T, held adjustably on the exterior tube, C, and extending to the graduation on the leveling-rod R. I prefer the construction shown in Figs. 6 and 7, in which the pointer is provided with a plate, T′, resting against one side of the outer tube, C, and against one side of the leveling-rod R near its graduation. One end, T^2, of the said plate T′ is bent at right angles and extends over the slot C′ and the graduation C^2 of the tube C, the other end, T^3, of the said plate T′ being on the graduation of the leveling-rod R.

On the inside of the plate T′ is pivoted an L-shaped arm, T^4, extending, with its arm T^5, on the outer tube, C, opposite the plate T′, and between the arm T^6 and the arm T^3 of the plate T′ is placed a spring, T^7, to force the arm T^5 in firm contact with the tube C, whereby the pointer T is clamped on the tube C and can be easily moved up and down to the position indicating the level of the liquid in the glass tube D.

I do not limit myself to the precise construction of the several parts as shown, as I may vary them according to special uses of the instrument.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. In a hydrostatic leveling-instrument, standards, and a tube for connecting the bases of the standards with each other, in combination with a cap secured to the upper end of each standard and provided with an air-inlet, a valve held to slide in the said cap and adapted to be raised and lowered, a plug held adjustably on the said cap, a chain supported by the said plug and connected with the said valve, and a weight held on the said chain inside of the said valve, substantially as shown and described.

2. In a hydrostatic leveling-instrument, the combination, with the standards, of a cap secured to the upper end of the standards and provided with an air-inlet, a valve held to slide in projections on the inside of the said cap, a plug provided with a spiral projection fitting into a similar offset on the said cap, a rod held yieldingly in the said plug, a chain connected with the said rod and passing through the open mouth of the valve into the interior of the latter, said chain being also connected with the bottom of the valve, and a weight held on the said chain in the said valve, substantially as shown and described.

3. In a hydrostatic leveling-instrument, the combination, with the base B, provided with the flanged ring B^3, of the tube C, fitting into the said flanged ring B^3, and provided with the reduced end C^3, secured to the bottom of the said base and having a central recess, a cock held in the said reduced end C^3 to open and close the said recess, and an outlet-plug screwing into the said reduced end and adapted to be connected with a flexible tube, substantially as shown and described.

4. In a hydrostatic leveling-instrument, the combination, with the base B, provided with the flanged ring B^3, of the tube C, fitting into the said flanged ring B^3 and provided with

the reduced end C^3, secured to the bottom of the base and having a central recess, a cock held in the said reduced end C^3 to open and close said recess, an outlet-plug screwing into the said reduced end and adapted to be connected with a flexible tube, and a filling-plug, F′, screwing in the said reduced end, substantially as shown and described.

5. The combination, with the liquid-containing standard, of a clamp having horizontal arms recessed on their adjacent faces to receive the ends of the standard and provided with vertically-aligned apertures, a leveling-rod passing through said apertures, a block on the inner side of the clamp, and means for pressing the block against the leveling-rod, substantially as set forth.

6. In a hydrostatic leveling-instrument, the combination, with the standard A, of the clamp S, supporting said standard A, a leveling-rod on which the said clamp is held to slide, and a pointer held adjustably on the said standard and indicating on the graduations of the said standards and the said leveling-rod, substantially as shown and described.

7. In a hydrostatic leveling-instrument, the combination, with the leveling-rod, of a standard held to slide on the said leveling-rod, and the pointer T, held to slide on the said standard, being provided with the plate T′, the L-shaped arm T^4, and the spring T^7, substantially as shown and described.

CHARLES ALLEN KARR.

Witnesses:
JESSE VOIERS,
M. J. VOIERS.