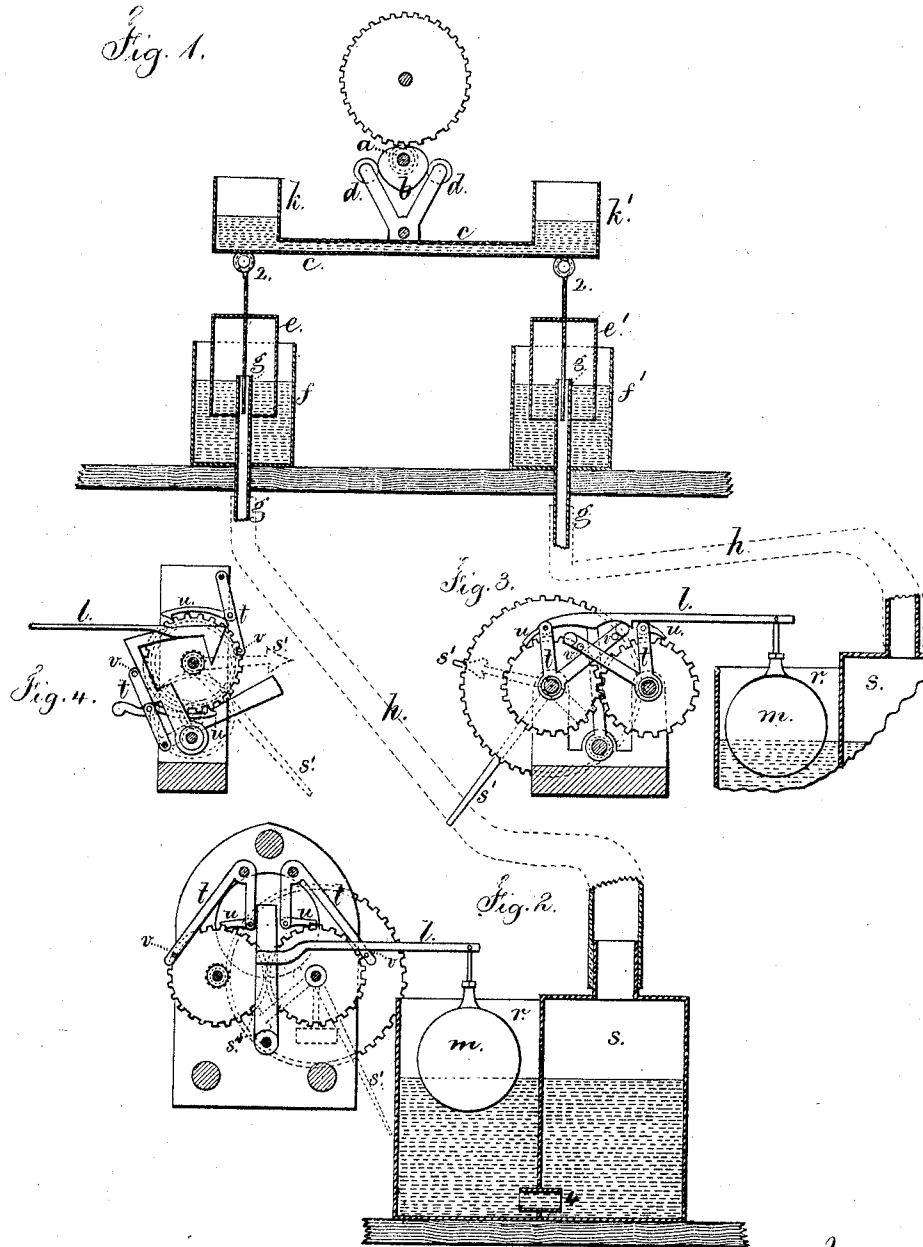


H. J. WENZEL.

Transmitting Time-Movements to Distant Dials.

No. 140,661.

Patented July 8, 1873.



Witnesses,
 Chas. Smith
 Geo. D. Haller.

Inventor
 Hermann J. Wenzel,
 Lemuel M. Ferrell
 atty.

UNITED STATES PATENT OFFICE.

HERMANN J. WENZEL, OF SAN FRANCISCO, CALIFORNIA.

IMPROVEMENT IN TRANSMITTING TIME-MOVEMENTS TO DISTANT DIALS.

Specification forming part of Letters Patent No. **140,661**, dated July 8, 1873; application filed March 21, 1873.

To all whom it may concern:

Be it known that I, HERMANN JULIUS WENZEL, of San Francisco, in the State of California, have invented an Improvement in Connecting Different Dials with a Time-Piece, of which the following is a specification:

This invention is intended to actuate two or more dials synchronously from one time-piece, and that without any material loss by friction and without much resistance to the movement of the time-piece.

A bellows or pump has been operated periodically by clock-work to force air or liquid through a tube to operate a distant mechanism for moving the hands upon a dial or dials in unison with the main clock-movements, but the changes of temperature and atmospheric pressure were liable to derange the operation.

My invention consists in cylinders that are raised and lowered by clock-work, and the open lower ends enter liquid contained in a vessel and force the confined atmosphere to the distant mechanism where the atmosphere acts upon liquid to change its level in a vessel, and thereby move a float and the mechanism that operates the dials. The actuating-cylinder rises entirely above the liquid each movement, so that the pressure of the atmosphere within the tubes of the apparatus is equalized and no derangement can result from thermometric or barometric changes. The resistance offered to the time-piece by the cylinders that are forced down in the liquid is partially compensated by a liquid-equalizer between the time-piece and the cylinders.

In the drawing, Figure 1 is an elevation representing the apparatus at the time-piece, and Fig. 2 represents one of the dials and the means for moving the hands. Figs. 3 and 4 illustrate modifications in the ratchet-and-pawl mechanisms.

The shaft *a* is part of, or connected with, any suitable time-piece, and revolved once in a minute or in any regular interval of time. Upon this shaft *a* is a cam, *b*, that gives motion to the oscillating lever *c*, through the medium of the arms and rollers *d*. Near the ends of the lever *c* are cylinders *e e'*, suspended by wires or rods from the joints *h h*, and

these cylinders are open at bottom ends, closed at top, and hang within the cups or vessels *f f'*, containing liquid such as glycerine, and in the center of these vessels *f f'* are tubes *g*, rising above the surface of the liquid and open at the upper ends. As the lever *c* is oscillated the cylinders *e e'* are raised and lowered in the liquid contained in the vessels *f f'*, and, in so doing, the air is alternately drawn in and forced out through the tubes *g* and through India-rubber or other tubes *h*, that extend to the apparatus hereafter described at the dials in the various places where it is necessary to indicate the time, or perform any other operation. The cylinders *e e'* should lift out of the liquid each upward movement, so that the atmosphere within the tube and that outside the same equalize in pressure, and no difficulty arises from change of atmospheric condition, such as would result if the air was confined. As the cylinders *e e'* are alternately forced down into the liquid the resistance becomes greater, both in consequence of the immersion of the cylinder and the slight compression of the air, and, at the same time, the other cylinder is being lifted and the air drawn into the same; hence there is a force at both ends acting against the clock-work. I therefore provide for neutralizing this by an equalizer applied to the lever *c*, consisting of two vessels, *k k'*, one at each end of the lever and connected by a tube and containing glycerine, mercury, or other liquid, the size or shape of the vessel being proportioned to the weight required. When the lever *c* stands level the forces are all balanced, but as it is tipped the liquid runs into the lowest vessel and becomes a sufficient surplus weight to counterpoise the other forces aforesaid. At the clock-dial the proper hands *s* and connecting gearing are provided, and also a ratchet-wheel or wheels, and a pawl or pawls, to turn the wheels through the agency of a lever, *l*, and float, *m*, that is raised or lowered by the alternate action of the atmosphere in the tubes *g* and *h*. The float *m* is within the compartment *r*, and near it is a second compartment, *s*, that communicates with *r* by the opening *4*, and the tube *h* is connected to a pipe at the closed end of compartment *s*. It will

now be apparent that when the cylinder *e* is forced down into the liquid, in *f*, the water or other liquid will be forced by the atmosphere out of the compartment *s*, and, rising in *v*, will float the ball *m* and operate the clock-movement to the hands; thus the float *m* will move up and down with the cylinder *e*.

I have shown the levers *t*, with the pawls *u* and the stop-pins *v*, acted upon by the lever *l*, to communicate motion to the gears that turn the hands. These pawls or clocks and stops may be of any desired character, and the power from the float *m* and lever *l* may be used for any other operation which it is adapted to.

I claim as my invention—

1. A cylinder or vessel, raised and lowered

periodically by clock-work into and out of liquid contained in a vessel, in combination with the tube connecting to a distant vessel containing a float that actuates the mechanism of a dial in unison with the main clock mechanism, substantially as set forth.

2. The equalizing-vessels *k k'* connected by a tube, in combination with the cylinders *e e'*, vessels *f f'*, and tubes *g g'*, substantially as and for the purposes set forth.

Signed by me this 4th day of March, A. D. 1873.

HERMANN J. WENZEL.

Witnesses:

LOUIS BECKERS,

GUS. FUSZENEGGER.