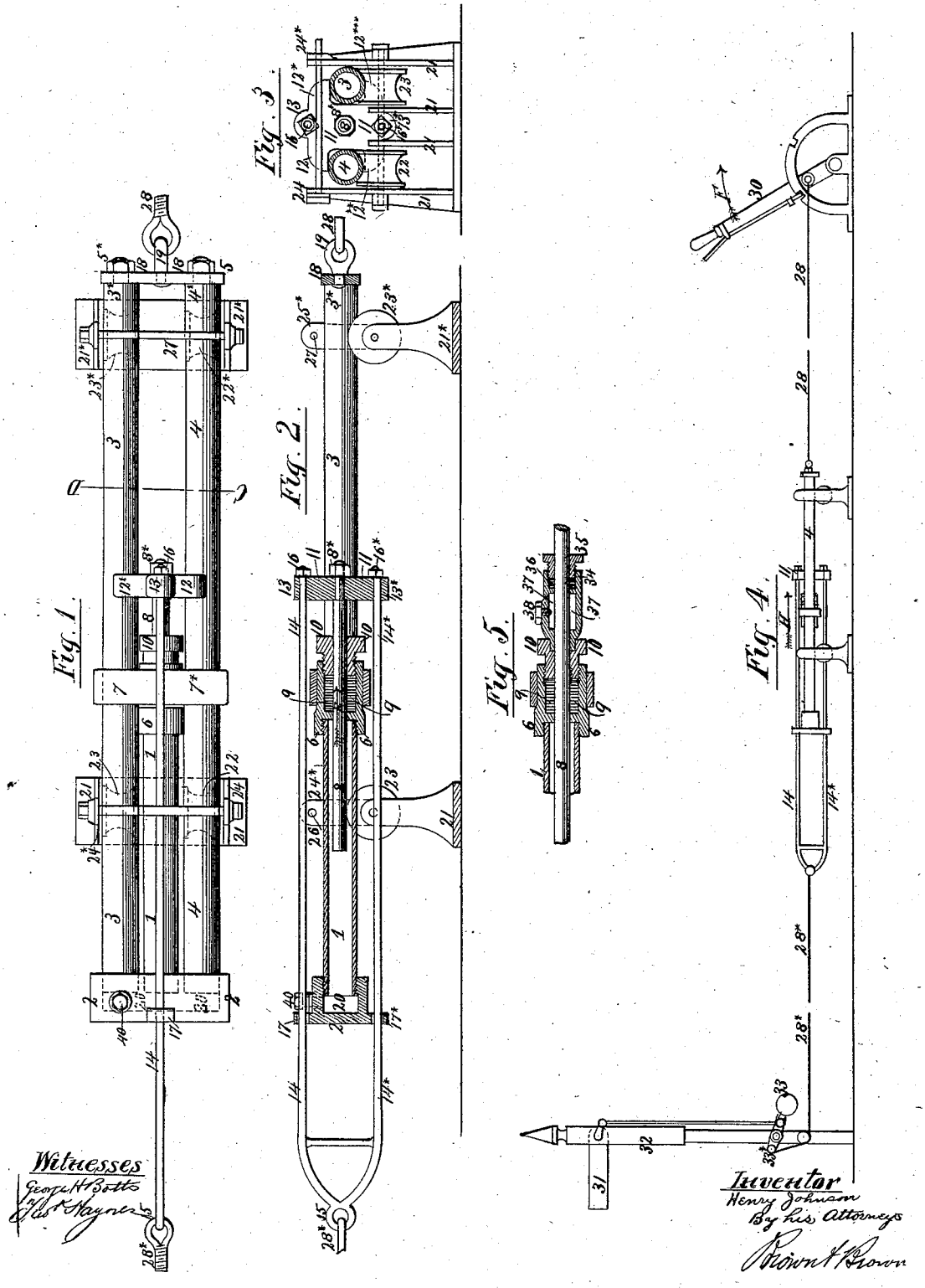
(No Model.)

H. JOHNSON.

APPARATUS FOR OPERATING RAILWAY SIGNALS.

No. 259,865. Patented June 20, 1882.



N. PETERS. Photo-Lithographer. Washington, D. C.

UNITED STATES PATENT OFFICE.

HENRY JOHNSON, OF ECCLES, COUNTY OF LANCASTER, ENGLAND.

APPARATUS FOR OPERATING RAILWAY-SIGNALS.

SPECIFICATION forming part of Letters Patent No. 259,865, dated June 20, 1882.

Application filed January 7, 1882. (No model.) Patented in England December 27, 1879, No. 5,297; in France July 3, 1880, No. 137,595; in Belgium July 19, 1880, No. 52,064, and in Germany July 20, 1880, No. 14,147.

To all whom it may concern:

Be it known that I, HENRY JOHNSON, of Eccles, in the county of Lancaster, England, have invented certain new and useful Improvements in Apparatus for Operating Railway-Signals, (for which I have obtained Letters Patent of Great Britain No. 5,297, dated December 27, 1879, a Brevet d'Invention of the Republic of France, No. 137,595, dated July 3, 1880, a Brevet d'Importation of the Kingdom of Belgium, No. 52,064, dated July 19, 1880, and a patent of the German Empire, No. 14,147, dated July 20, 1880,) of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to that part of signaling apparatus which connects the actuating-lever to the arm or other such part of the railway semaphore-signal; and it consists in a method of compensating for alterations due to temperature in the length of the connecting wire, rod, chain, or other such apparatus. For this purpose I introduce within the length of such wire, rod, or chain, and between two sections thereof, a tight vessel containing liquid provided with a cylinder and piston, which liquid, on its expansion or contraction according to changes of atmospheric temperature, regulates the tension of the said wire, rod, or chain.

I will now proceed to describe a method by which my invention may be practically carried into effect.

In the accompanying drawings, Figures 1, 2, and 3 show my apparatus for compensating the variations in the length of the wires, rods, or chains which connect the signal and the actuating-lever, similar letters of reference being placed upon corresponding parts in each of the figures. Fig. 1 is a plan. Fig. 2 is a central longitudinal vertical section, and Fig. 3 is a cross-section taken on the line C D of Fig. 1.

At 1 is a cylinder, screwed at one end into a cross-cap, 2. Into this cross-cap 2 are screwed the ends of pipes or tubes 3 4. The other ends, 3* 4*, of the pipes 3 4 are formed solid, so as to be closed, a projecting part thereof being provided with screwed nuts 5 5* for attaching a cross-plate, 18, to the ends of the tubes 3 4, the pipes or tubes 3 4 and cross-caps 2 18 forming a frame to carry the before-named cylinder 1, and for other purposes to be hereinafter described.

The cylinder 1 is provided with a cap, 6, screwed thereon, which is supported by a clip having projecting parts 7 7*, through which the tubes 3 4 pass, such a clip serving to support one end of the cylinder 1. The cylinder 1 is provided with a piston or ram, 8, passing through a packing, 9, within the cap 6, such packing being compressed by a screwed gland, 10, screwing into the cross-cap 6.

I may here remark that I do not confine myself to the use of the above-described method of forming a joint between the piston or ram 8 and the cylinder 1, as other methods of packing may be substituted.

Upon the end of the piston or ram 8, outside the cylinder 1, is a cross-head, 11, fixed upon the ram 8 by a screwed nut, 8*, formed with projecting ears or parts 12 12* 12** 12***, embracing the pipes or tubes 3 4, but free to slide thereon, thereby acting as guides to support the outer end of the piston or ram 8. This cross-head is also provided with projecting parts 13 13*, through which the ends of rods 14 14* pass. These rods are jointed together so as to form a loop at 15, their other ends being provided with screwed nuts 16 16*. The rods 14 14* pass through ears 17 17* formed upon the cross-cap 2, such ears acting as guides or supports to the rods 14 14*.

To the cross-plate 18 a loop or eye, 19, is attached by riveting. The purpose of this loop or eye 19, I shall hereinafter describe.

The interior of the cylinder 1 communicates with the interior of the pipes or tubes 3 4 by means of a cavity, 20, formed within the cross-cap 2, as shown by dotted lines in Fig. 1.

At 21 21* are frames carrying grooved supporting rollers or pulleys 22 22* 23 23*, upon which the pipes or tubes 3 4 rest, so as to be capable of being moved thereon, as will hereinafter be described. The frames 21 21* are formed with extended parts 24 24* 25 25*, through which pass bolts 26 27, which extend across and above the tubes 3 4, thereby preventing the apparatus from being lifted from

the rollers 22 22* 23 23*; but whenever it becomes desirable to remove the apparatus for repair or other purpose the bolts 26 27 may be withdrawn and the apparatus may be removed without disturbing the frame 21 21*.

The wire or chain 28 (shown broken for convenience of illustration) is secured at one end to the loop or eye 19, the other end thereof being connected to the usual hand-lever used for actuating the signal. The wire or chain 28* is secured at one end to the loop 15, formed upon the rods 14 14*, and at its other end is secured to the ordinary lever at the signal-post, which acts upon the atmospheric signal.

The length of the wires, rods, or chains connecting the hand-lever with the signal, as is well known, expands or contracts with variations of temperatures, and my invention compensates for such variations in the length of the aforesaid connecting wires, rods, or chains in the following manner: The tubes or pipes 3 4, the interior of the cross-cap 2, and the cylinder 1 are filled with liquid, and as such liquid expands by increased temperature it will force the piston or ram 8 in the direction of the arrow E, (shown in Fig. 2,) thereby drawing the two portions 28 28* of the wire, rod, or chain connecting the hand-lever and the signal nearer to each other, thereby compensating for the increased length of such connecting wire, rod, or chain aforesaid, arising from increased temperature. When the wires, rods, or chains aforesaid become contracted by decreasing temperature the piston will thereby be forced into the cylinder in a direction opposite to that shown by the arrow E, the contraction of the before-named liquid caused by the decreased temperature allowing such movement of the piston or ram 8 to take place. The quantity of liquid contained within the pipes 3 4, cross-cap 2, and cylinder 1 must be proportioned to the length of wire to be compensated; or the diameter of the piston or ram 8 may be increased or decreased for the like purpose. When the hand-lever is moved to actuate the signal the piston 8, pipes or tubes 3 4, cylinder 1, and other parts of the compensating apparatus move bodily upon the rollers 22 22* 23 23*, such rollers also allowing for the alteration in the relative positions of the parts arising from variations of temperature.

At 40 is a plug screwed into and closing an aperture formed on the cap 2, for the purpose of putting the liquid into the interior of the tubes 3 4 and cylinder 1.

The pipes 3 and 4 form a reservoir for containing a large supply of liquid, so as to give a greater length of movement of the ram or piston than would be secured with the cylinder alone; but, instead of the pipes 3 and 4, I may provide a separate reservoir or vessel, which may be stationary, and connect such vessel to the cylinder containing the piston or ram by means of a flexible tube, such flexible tube allowing for the movement of the cylinder during the working of the signal.

Fig. 4 illustrates the above-described apparatus applied within a length of wire, rod, or chain connecting the ordinary hand-lever, 30, with the semaphore-signal, 31, similar letters of reference being placed upon the parts corresponding to those of the previously-described figures, 1, 2, and 3.

At 30 is the hand-lever as ordinarily used for actuating semaphore-signals.

At 32 is an ordinary semaphore-signal post, the arm 31 of which is pulled to "danger" by means of the usual weights, 33.

At 28 28* is the wire, rod, or chain used to connect the hand-lever 30 and semaphore-arm 31, but broken off for convenience of illustration. This wire, as previously stated, is subject to variations of length caused by variations of atmospheric temperature, such variations of length causing a partial movement of the semaphore-arm. To compensate for such contractions or expansions I insert the apparatus shown in Figs. 1, 2, and 3 between the hand-lever 30 and signal 31 in the following manner: The wire 28, attached to the tubes 3 4 and cylinder 1, is connected to the hand-lever 30. The piston or ram 8 is connected through the cross-head 11, side rods, 14 14*, to the rod or chain 28*, connected to the lever 33* of the ordinary semaphore-signal arrangement. When the hand-lever 30 is pulled over in the direction of the arrow F such movement tends to force the ram or piston within the cylinder 1; but the liquid contained therein preventing the movement of the ram 8, the ram 8 and cylinder 1 are drawn bodily forward, and through the cross-head 11, side rods, 14 14*, and rod, wire, or chain 28* actuates the signal 31 in the usual manner. Upon an increase of atmospheric temperature taking place the wire, rod, or chain 28 28* becomes expanded; but such increase of temperature also expanding the liquid contained within the pipes or tubes 3 4 and cylinder 1, the ram 8 is forced outward in the direction of the arrow H shown in Fig. 2, thereby taking up the slack wire or chain, which would otherwise have existed. If, on the contrary, the atmospheric pressure decreases and the wire 28 28* contracts, the liquid contained within the tubes 3 4 and cylinder 1, also contracting, allows the piston or ram to be moved in opposite direction to that of the arrow H by the weight 33, thereby keeping the wire or chain 28 28* at a uniform tension.

In cases where much dust or grit may accumulate upon the piston or ram 8, I propose to make use of the following arrangement for removing such dust and dirt aforesaid from that portion of the ram which is outside the packing 9, and preventing such packing being injured thereby: Within the gland 10, I form a screw, into which I screw a part, 34, provided with a screwed gland, 35, for retaining in position a packing, 36. As the ram 8 passes into the cylinder 1 the packing 36 will strip off any dust or dirt that may be upon the ram 8, thereby cleansing the ram before it passes

into the packing 9. Within the part 34 and around the piston or ram 8, I form an annular cavity, 37, within which cavity I place material for lubricating the piston or ram 8, such lubricant being inserted within the cavity 37 through an opening formed through the part 34, such opening being closed by means of a screwed plug, 38, after inserting the lubricating material.

I have only shown the compensating apparatus as applied to one description of signal; but it will be readily understood that it is also applicable to other signals actuated by means of a rod, wire, or chain in a manner similar to that shown at Fig. 4.

Having now described my invention and the manner of carrying the same into effect, I desire it to be understood that I claim—

1. The combination, with a railway-signal and its actuating lever or device, of a wire, chain, or other connection extending between them, and composed of sections, a cylinder containing liquid, and to which one section of said connection is attached, and a piston or ram to which the other section of said connection is attached, and which is adapted to move relatively to the cylinder as the liquid expands or contracts, substantially as and for the purpose specified.

2. The combination, with a railway-signal and its actuating lever or device, of a sectional connection extending between them, a liquid-reservoir, and a cylinder communicating therewith, and to which one section of said connection is attached, and a piston or ram to which the other section of said connection is attached, and which is adapted to move relatively to the cylinder as the liquid in said reservoir and cylinder expands or contracts, substantially as and for the purpose specified.

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