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Patented Feb. 27, 1900.

W. B. LOWE, JR.
SIGNAL APPARATUS FOR BOILERS.

(Application filed Dec. 2, 1898.)

(No Model.)

2 Sheets—Sheet 1,

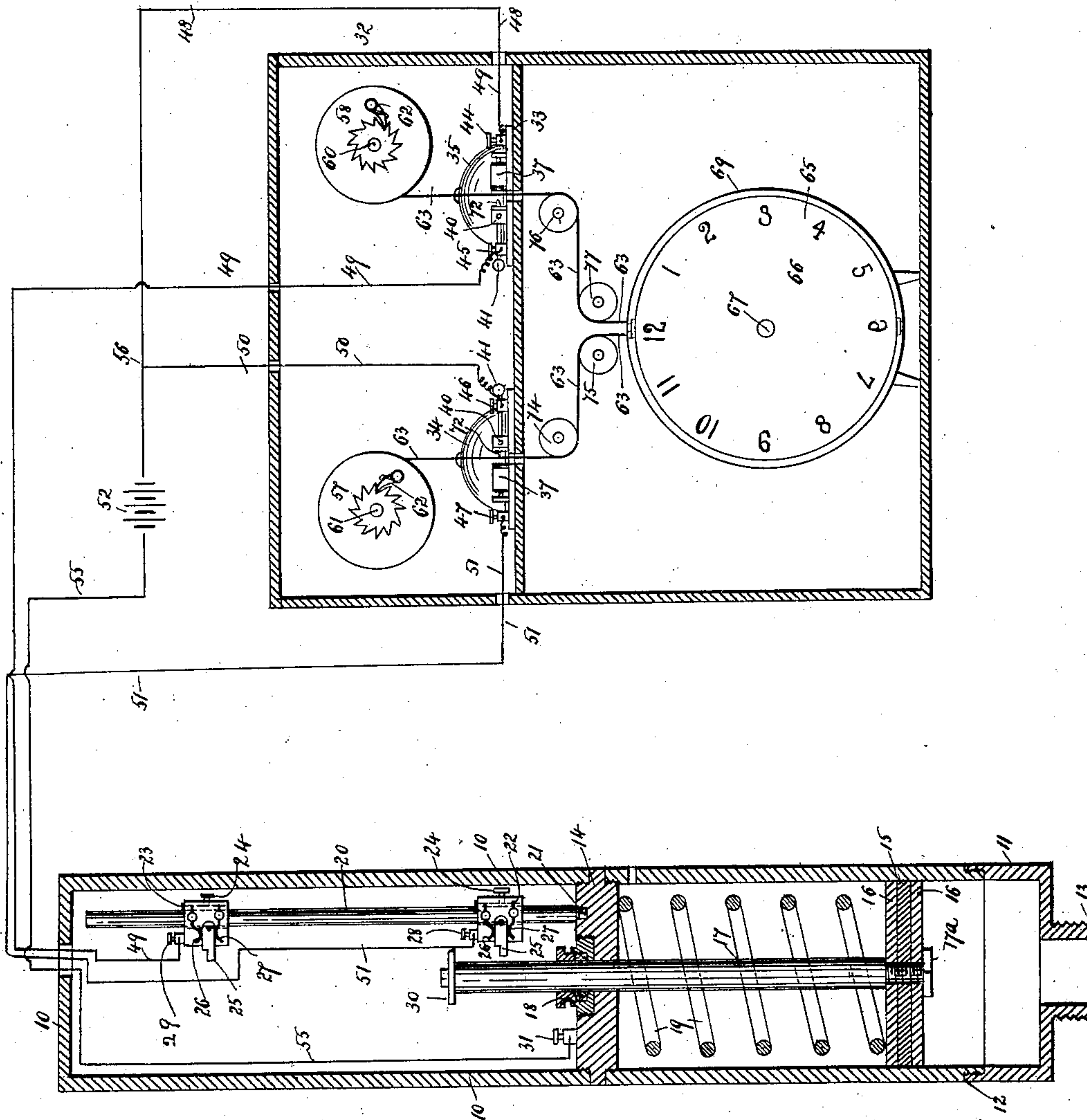


Fig. 1.

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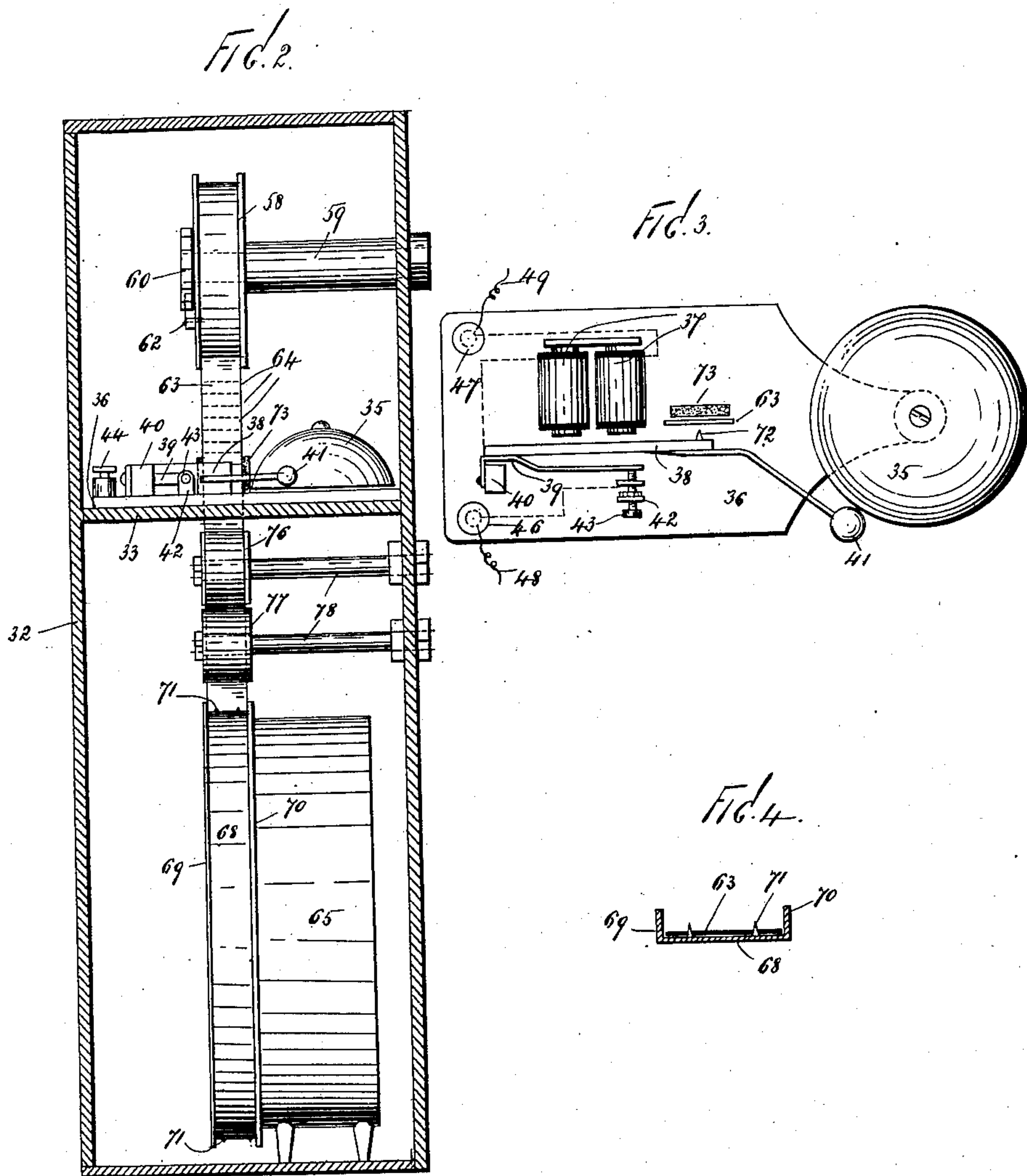
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(Application filed Dec. 2, 1898.)

2 Sheets—Sheet 2.

(No Model.)



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SIGNAL APPARATUS FOR BOILERS.

SPECIFICATION forming part of Letters Patent No. 644,433, dated February 27, 1900.

Application filed December 2, 1898. Serial No. 698,060. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM BELL LOWE, Jr., a citizen of the United States, residing at Atlanta, in the county of Fulton and State of Georgia, have invented certain new and useful Improvements in Signal Apparatus for Boilers, of which the following is a full and complete specification, such as will enable those skilled in the art to which it appertains to make and use the same.

This invention relates to signal apparatus for boilers, and has more particular reference to devices of the class described for steam-boilers, gas-tanks, and analogous constructions, comprising a pressure alarm-signal and a time-recording attachment to accurately register the hour or division thereof at which a certain pressure was indicated by the alarm-signal.

The purpose of the invention is to produce an apparatus of the class described which shall be positive and accurate in its action and at the same time simple and comparatively cheap in construction; and the invention is fully disclosed in the following specification, of which the accompanying drawings form a part, in which like numerals of reference denote like parts in the several views, and in which—

Figure 1 is a vertical sectional elevation of the casings of my device, the parts thereof being shown in full lines, the pressure-actuated device being shown on an enlarged scale. Fig. 2 is a vertical sectional side elevation of the casing of the signal-recording apparatus, on an enlarged scale, showing the parts thereof in full lines. Fig. 3 is an enlarged plan view of one of the electric signal-bells and attachments; and Fig. 4 is a cross-sectional view of the tape-rim, recording-tape, and fastening means therefor.

Referring more particularly to the drawings and to Fig. 1 thereof, 10 is the metal casing, preferably cylindrical, of a pressure-actuated device used in my apparatus, and it is provided with a removable bottom portion 11, which is adapted to be screwed thereon, as at 12, and the bottom portion 11 is provided with an exteriorly-screw-threaded annular flange or connection 13, which is adapted to be screwed into a boiler, gas-tank, or other receptacle the pressure of which it

is desired to record. A head 14 is rigidly secured in the casing 10, approximately centrally thereof, and the head 14 is metallic or of suitable electrically-conducting material and may be insulated from the casing 10, if desired. A piston 15 is slidably mounted in the casing 10 below the head 14 and fits said casing 10 snugly, being preferably provided with suitable packing-strips, which prevent the passage of steam, &c., between its edge portion and said casing 10. A piston-rod 17 is secured at its lower end to the piston 15, passing therethrough and being provided with a screw-thread, which a nut 17^a engages below the piston 15. The piston-rod 17 passes slidably through the head 14, which is provided with a packing or a stuffing box 18, as shown in the drawings. A coil-spring 19 surrounds the piston 17 between the piston 15 and the head 14 and exerts downward pressure against the piston 15, against the under surface of which steam, &c., presses, passing from the boiler or other receptacle through the connection 13.

A circuit member 20, which consists of a section of stiff wire or rod, is secured in an upright position to the head 14, being preferably screwed into the latter, as at 21, and suitably insulated therefrom.

Slidably mounted upon the member 20 are two blocks or circuit members 22 and 23, each of which bears an adjusting-screw 24, which is adapted to be screwed against the rod 20 and maintain the respective blocks in vertically-adjusted position. Each of the latter is provided with pivoted contact pieces or fingers 25, each of which is normally held in a horizontal position by means of springs 26 and 27, mounted adjacent thereto and adapted to press thereon respectively from below and from above. Each of the blocks 22 and 23 is provided with a binding-post 28 and 29, respectively, with which a circuit-wire may be connected.

The piston-rod 17 is provided at its upper end with a contact-plate 30, which is preferably screwed thereon and adapted to come into contact in the operation of the device with the contact pieces or fingers 25 of the blocks 22 and 23, the said fingers being cut away at their end portions, as shown, to allow of a more perfect contact. The springs

26 and 27 allow each of the fingers 25 to oscillate should the motion of the piston-rod 17 force the contact-plate 30 beyond the path of reciprocation limited by the fingers 25 in the position shown. A binding-post 31 is secured to the head 14.

Alarm-signals, one to indicate low pressure and the other high pressure, are connected with the above-described pressure-actuated device, and the construction of these alarm-signals is as follows:

Referring to Figs. 1, 2, and 3, 32 is a casing of wood or other suitable material, which is provided with an interior shelf 33, and upon this shelf is supported a pair of vibratory electric bells 34 and 35, preferably of different size and tone, one of which is fully shown in Fig. 3. Each of the bells is mounted upon the usual base-plate 36, which supports the electromagnets 37 and the armature 38, which is mounted upon the spring-plate 39, secured by a metal post 40 to the base-plate 36. The armature 38 bears the hammer 41 in proximity to the bell 34, and the usual circuit-breaker 42 is mounted in the base-block 36, and the adjustable screw 43 passes through it and operates in connection with the spring-plate 39 in the customary manner. Binding-posts 44, 45, 46, and 47 are mounted in the base-blocks 36 of the two bells 34 and 35, and circuit-wires 48, 49, 50, and 51 are electrically connected with the respective binding-posts 44, 45, 46, and 47.

It is understood that the base-blocks 36 are wired in the usual manner, the circuit being in each case, referring to Fig. 3, from the binding-post 46 to the circuit-breaker 42, to the metal post 40, to the electromagnets 37, and to the binding-post 47.

A battery 52 is shown in Fig. 1 and is conveniently located with respect to the casing 32 and is connected up with the bells 34 and 35 and the electrical connections of the pressure-actuated device shown in Fig. 1 as follows: The battery 52 has two circuit-wires 55 and 56, one of which, 55, is electrically connected with the binding-post 31, as shown in Fig. 1. The other battery-wire 56 is connected electrically with the wires 48 and 50 in connection with the bells 35 and 34, respectively. The wire 49 of the bell 35 connects with the binding-post 29 on the upper block 23 on the rod 20 in the casing 10 of the pressure-actuated device, and the wire 51 of the bell 34 connects with the binding-post 28 on the lower block 22 on the rod 20 in the gage-casing.

The block 22 shall be designated as the "low-pressure" block and the block 23 as the "high-pressure" block. It is evident that if the pressure in the casing 10 of the pressure-actuated device beneath the piston 15 be such as to force the piston-rod 17 upward to such a height that the contact-plate 30 shall come into contact with the finger 25 on the block 23 the bell 35 will begin to ring, the closed electric circuit being from the block 23,

through the wire 49, through the electromagnet 37, the armature 38, the post 40, the spring 39, the circuit-breaker 42, the wire 48, the battery-wire 56, the battery 52, the battery-wire 55, the head 14 in the casing 10, the piston-rod 17, the contact-plate 30, and back into the block 23. The bell will continue ringing as long as the contact-plate 30 remains in contact with the finger 25 on the block 23, the armature 38 of the bell 35 and the spring 39 connected therewith operating in connection with the intermittently-excited coils of the electromagnet 37 and with the circuit-breaker 42 in the usual and well-understood manner. The bell 34 and connections will operate in the same manner, as will be fully understood, when the contact-plate 30 comes into contact with the finger 25 of the block 23. It will thus be seen that with the blocks 22 and 23 adjusted upon the rod 20 at any relative distance desired any desired low and high pressure may be automatically indicated by the bells 34 and 35.

The time-recording attachments which I employ consist as follows: Two drums 57 and 58 are revolvably mounted in the casing 32, respectively over the bells 34 and 35, each by means of a support 59, (shown in Fig. 2,) which tapers to form an axle 60, which passes through each of the drums and bears rigidly at the outer end a ratchet-wheel 61, upon which a pawl 62, pivoted to each of the drums, operates. These drums 57 and 58 each bear a roll of tape, ribbon, or similar substance 63, which will readily take an inked impression and is adapted to be unrolled from each of the drums 57 and 58, as indicated by the arrows, the pawls 62 preventing reverse movement of the said drums. The tapes are preferably of different colors and are provided with graduations 64, as seen in Fig. 2, to denote the hours and divisions thereof. The drums 57 shall be denoted as the "low-pressure" and the drums 58 as the "high-pressure" drums. A clock mechanism 65 is located in the casing 10 beneath the shelf 33 and is constructed similarly to the ordinary timepiece, with the exception that the dial 66 is constructed, preferably, of metal plate and is secured rigidly to the ordinary pointer-shaft by a screw 67 and is revoluble therewith and is provided with a rim 68, having flanges 69 and 70, (best seen in Fig. 4,) which extend, preferably, rearwardly and ride upon the circumference of the clock-casing, which is preferably of circular form, as shown. The rim 68 is provided with radial teeth 71, which are adapted to pierce the tapes 63 and wind them about the revolving rim 68. The tapes 63 on leaving the drums 57 and 58 pass downward adjacent to the outer end of the armatures 38 of the bells 34 and 35, as shown in Figs. 1, 2, and 3, and each armature is provided with a marking-point 72, and each base-block of the bells 34 and 35 is provided with an ink or carbon pad 73 (shown in Fig. 3) and mounted adjacent to the marking-point 72 and the tape 63, which

passes between the marking-point 72 and ink-pad 73. Below the ink-pad 73 the tapes 63 pass about a series of revoluble guide pulleys or spools 74, 75, 76, and 77, mounted upon standards 78, secured in the casing 42, and thence the tapes 63 pass to the rim 68 upon the clock 65 and are wound thereon, as described.

The graduations 64 upon the tapes 63 are disposed at such separating distance as shall correspond to the same distances which a point on the rim 68 will travel during given periods of time. For example, if a point in the flange 68 consume one hour in traveling half an inch the hour-graduations on the tapes 63 will be one-half inch apart. Providing it is desired to start the recording mechanism at twelve o'clock, the tapes, one from each of the drums 57 and 58, are brought down and the ends secured upon the rim 68, one above the other, and an hour-graduation brought to register with each of the marking-points 72, which graduations may be marked "12," the next "1," the next "2," and so on for the hours of the day.

The operation of the time-recording attachment is as follows: When the clock mechanism 65 starts into operation by means of the rim 68, integral with the face thereof, it draws the tapes 63, one each from the high-pressure drum 58 and the low-pressure drums 57, down past the marking-points 72, and if either of the armatures 38 be vibrated during the ringing of either of the bells 34 or 35 the corresponding marking-point 72 will drive the tape 63 against the pad 73 and mark it at the hour designated by the graduation 64, which at that moment is in position before it.

The operation of my signal apparatus will be readily understood from the foregoing description when taken in connection with the accompanying drawings and the following statement thereof.

Steam, gas, or other substance the existence of a predetermined pressure of which in a boiler-tank or other receptacle it is desired to indicate and the time of the existence of which pressure it is desired to record passes into the casing 10 through the connection 13 and exerts pressure against the under surface of the piston and the spring 19 and determines the altitudinal position the piston 15, the piston-rod 17, and the contact-plate 30 shall have in the casing 10. If the pressure be so small as to bring the contact-plate 30 into contact with the finger 25 of the low-pressure block 22, the low-pressure bell 34 will ring and the tape 63 from the low-pressure drum 57 will be marked by the corresponding marking-point 72 at the corresponding hour. Similarly, because of duplicate construction, as described, if the pressure beneath the piston 15 is such as to raise the contact-plate 30 into contact with the finger 25 of the high-pressure block 23 the high-pressure bell 35 will ring and the tape 63 from the high-pressure drum 58 will be marked by the corresponding marking-

point 72. This occurs as follows: A closed circuit is at once established through the finger 25, the block 23, the binding-post 29, the bell-wire 49, and the binding-post 45 in the bell base-block 36 of the bell 35, then through the electromagnet 37, the metal post 40, the band-spring 39 of the armature 38, the circuit-breaker 43, the binding-post 44, the bell-wire 48, the battery-wire 56, the battery 52, the battery-wire 55, the binding-screw 31 on the head 14 of the casing 10, the piston 17, the contact-plate 30, and into the high-pressure block 23, and again through the finger 25, connected therewith. When this circuit is completed, the hammer 41 of the bell 35 will ring, announcing the existence of high pressure in the boiler or other receptacle, and the bell 35 being of different tone from the bell 34 will not be confused therewith. While the bell 35 is ringing, the marking-point 72 of the armature 38 thereof will in its vibration continuously strike against the tape 63 and force it against the ink-pad 73, marking the tape at a point denoted by a graduation thereon, and as the clock mechanism 65 is in continuous motion revolving the dial-plate 66 and the rim 68 and the teeth 71 drawing the tapes 63 respectively from the high-pressure drum 58 and low-pressure drum 57 about the flange 65 the tape 63 from the high-pressure drum 58 will be marked at the proper graduation 64 thereof, the graduations having been placed at predetermined positions thereon to tally with the length of time it takes a point on the flange 68 to move through a given arc of its path.

The tapes 63 may be read immediately after any single marking thereof, and when they are wound upon the rim 68 they may be unwound from the rim 68 and read.

It is evident that many changes may be made in the construction and arrangement of parts of my device without departing from the spirit of my invention or sacrificing its advantages.

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

1. In an apparatus of the class described, two signal devices, time-recording tapes wound on spools mounted over said signal devices, each of said signal devices being provided with an electric magnet, and a pivoted armature, marking-points connected with each of said armatures, and pads supported adjacent to said armatures and between which and the armatures the tapes are adapted to be drawn, and a clock mechanism provided with a rotatable face with which said tapes are connected and on which they are adapted to be wound, substantially as shown and described.

2. In an apparatus of the class described, two signal devices, two recording-tapes, means for synchronously moving said tapes, each of said signal devices being provided with an electromagnet, and a movable armature,

marking-points connected with each of said armatures, and pads supported adjacent to said armatures and between which and the armatures the tapes are arranged to be drawn and means for closing an electrical circuit through said movable armature, substantially as shown and described.

3. In an apparatus of the class described, two signal devices, time-recording tapes, each of said signal devices consisting of a vibratory bell-striker provided with a movable armature, marking-points connected with said armatures, pads supported adjacent to said armatures and between which and the armatures said tapes are arranged to be drawn, means for closing an electrical circuit through said armatures and for synchronously moving said tapes, substantially as shown and described.

4. In an apparatus of the class described, two signal devices, time-recording tapes and means for synchronously moving said tapes, each of said signal devices being provided with an electromagnet and a movable armature, marking-points connected with said armatures, pads supported adjacent to said armatures and between which and said armatures said tapes are arranged to be drawn, said tapes being provided with graduations arranged at intervals in proportion to the speed at which they are moved, and the means for moving said tapes consisting of clock mechanisms provided with a rim which is actuated thereby and which is moved at a speed corresponding to the speed of a clock-pointer, substantially as shown and described.

5. In an apparatus of the class described, signal devices, time-recording tapes wound on spools mounted adjacent said signal devices, each of said signal devices consisting of a vibratory electromagnetic bell having a movable armature, marking-points connected with each of said armatures, pads supported adjacent said armatures and between which and said armatures tapes are arranged to be drawn, and a clock mechanism provided with a rotatable face operatively connected therewith, and with a rim about which said tapes are wound, said rim being provided with means for positively engaging said tapes, substantially as shown and described.

6. In an apparatus of the class described, a movable clock-face provided with a deflected rim upon which are arranged means for

positively engaging a tape or other recording member, and a recording-tape which is arranged to be moved by said rim at a predetermined speed, substantially as shown and described.

7. An apparatus of the class described, comprising a pressure-actuated device, consisting of a casing adapted to be connected with a boiler or similar device, a piston mounted therein, high and low contact devices in connection with which said piston operates, a pair of signal devices comprising electromagnetic vibratory bells respectively in electrical connection with high and low signal devices, each of said bells being provided with a movable armature, marking-points connected with said armatures, pads arranged adjacent said armatures, high and low pressure recording tapes, said tapes being arranged to pass between said marking-points and said bells, and means for moving said contact-tapes comprising a clock mechanism with which is operatively connected a movable dial with which said tapes are connected, and in connection with which they are synchronously revolved, substantially as shown and described.

8. In an apparatus of the class described, a pressure-actuated device, comprising a casing, a transverse head arranged therein, a piston operatively mounted in said casing and beneath said head, a rod connected with said piston and operating through said transverse head, an upright connected with said transverse head, and provided with two adjustable contact devices, said rod connected with said piston being provided with a contact device which operates in connection with the contact devices upon said upright, said contact devices upon said upright being provided with pivoted spring-actuated contact-pieces and high and low pressure signal devices in operative connection with said contact devices upon said upright, substantially as shown and described.

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

WILLIAM BELL LOWE, JR.

Witnesses:

SIDNEY SMITH,
EMMETT WALSH.