

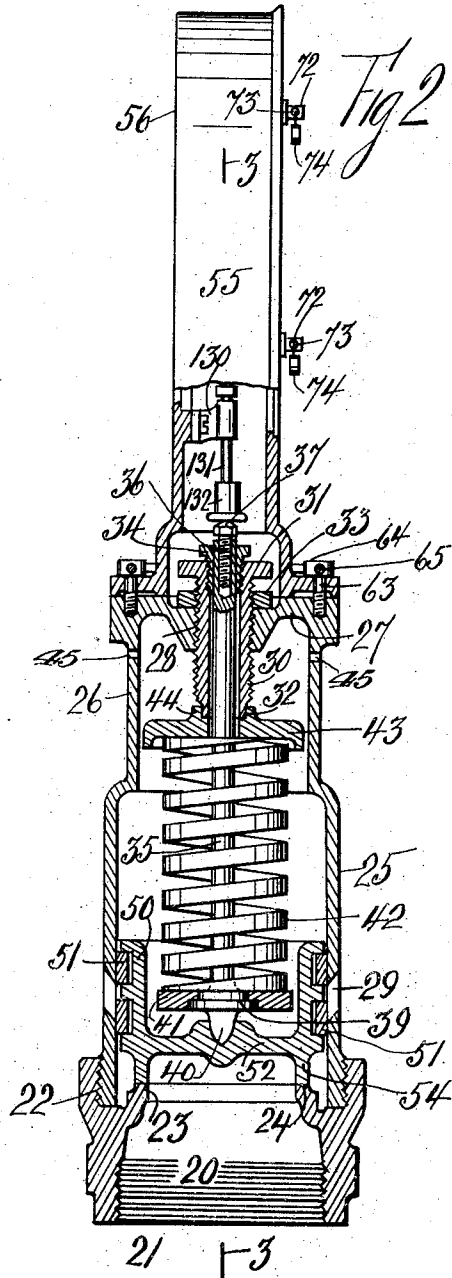
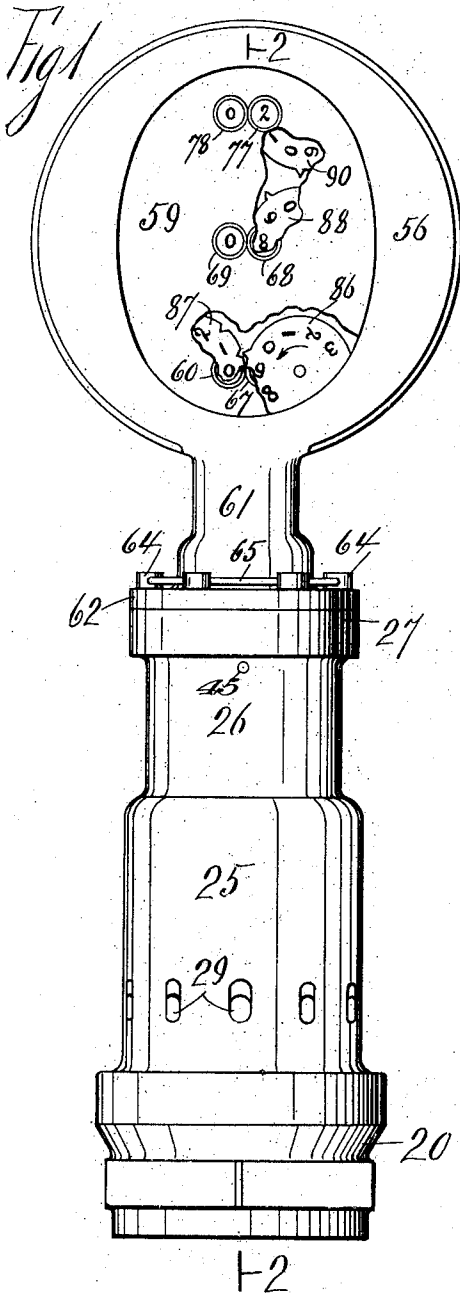
A. LUSUARDI.
REGISTER.

APPLICATION FILED AUG. 10, 1909.

984,436.

Patented Feb. 14, 1911.

4 SHEETS—SHEET 1.



WITNESSES:

Martin Gimansky.
Edwin Lewis

INVENTOR

Amilcare Lusuardi

BY *Nelle Romualdi*
his ATTORNEY

A. LUSUARDI.

REGISTER.

APPLICATION FILED AUG. 10, 1909.

984,436.

Patented Feb. 14, 1911.

4 SHEETS—SHEET 2.

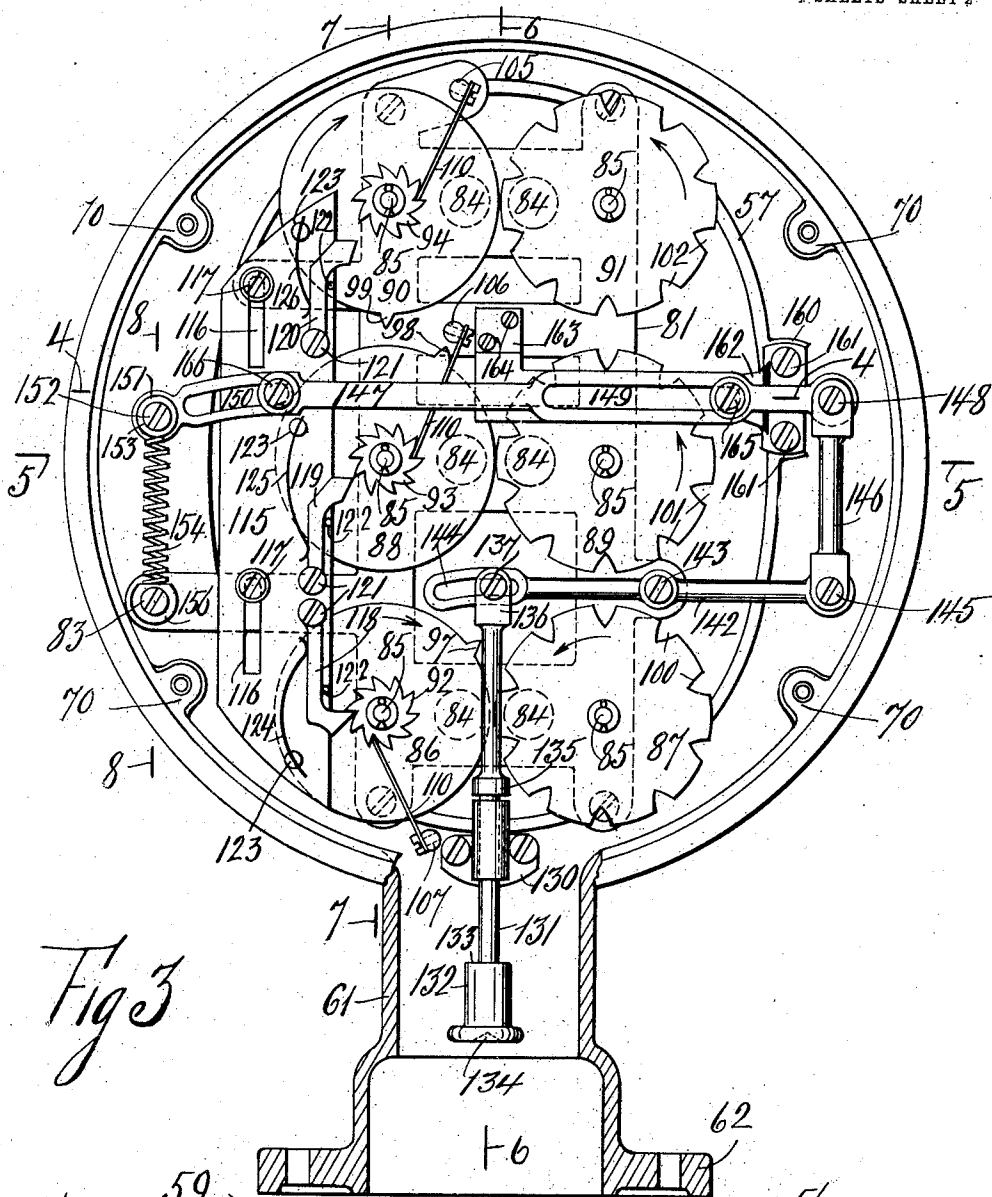


Fig 3

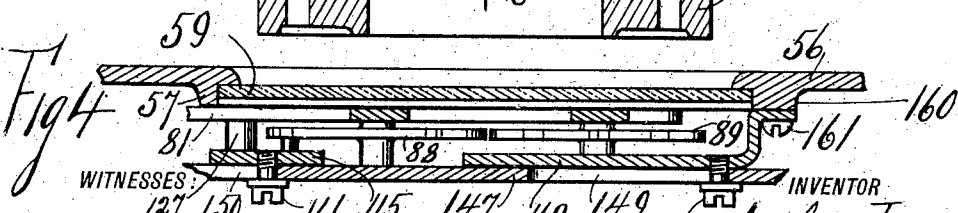


Fig 4

WITNESSES:

Martin Zimansky.
Edwin Lewis

INVENTOR

Amilcare Lusuardi
BY A. del Bove
his ATTORNEY

A. LUSUARDI.

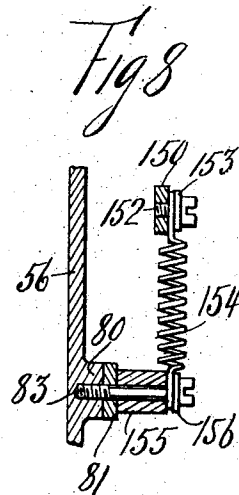
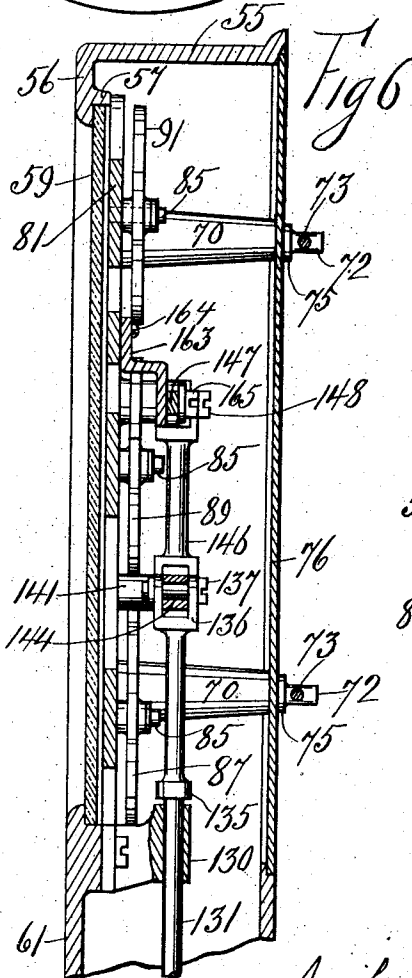
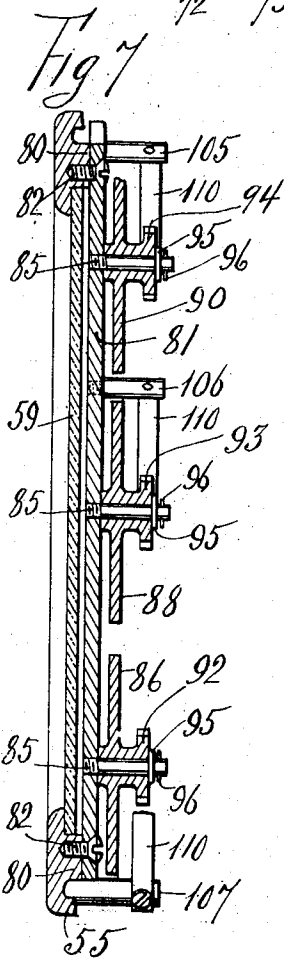
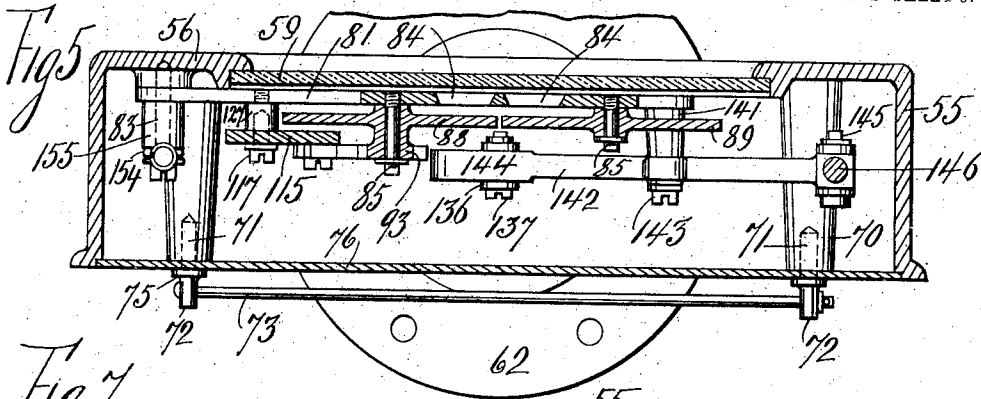
REGISTER.

APPLICATION FILED AUG. 10, 1909.

984,436.

Patented Feb. 14, 1911.

4 SHEETS—SHEET 3.



WITNESSES:

Martin Zimansky.
Edwin Lewis

INVENTOR

Amilcare Lusuardi
BY *Atte. Dornville*
his ATTORNEY

A. LUSUARDI.

REGISTER.

APPLICATION FILED AUG. 10, 1909.

984,436.

Patented Feb. 14, 1911

4 SHEETS—SHEET 4.

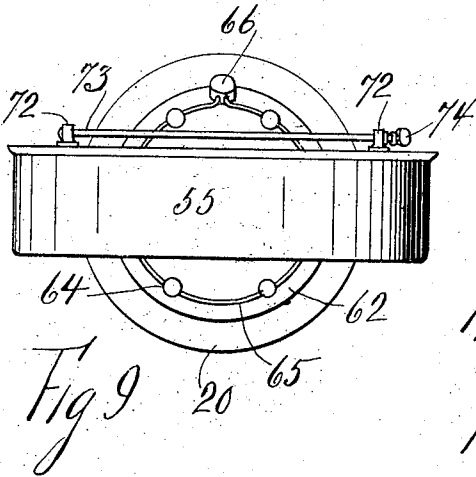
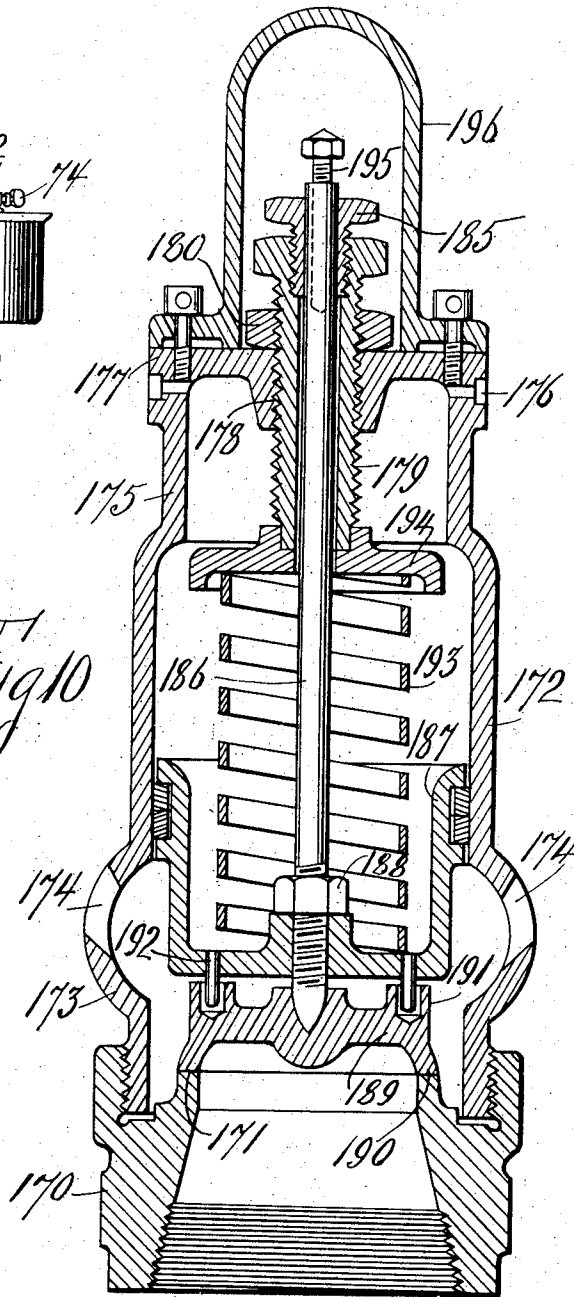


Fig 10



WITNESSES:

Martin Zimansky.
Edwin Lewis

INVENTOR

Amilcare Lusuardi

BY *At de Bormetta*
his ATTORNEY

UNITED STATES PATENT OFFICE.

AMILCARE LUSUARDI, OF RIO DE JANEIRO, BRAZIL.

REGISTER.

984,436.

Specification of Letters Patent. Patented Feb. 14, 1911.

Application filed August 10, 1909. Serial No. 512,165.

To all whom it may concern:

Be it known that I, AMILCARE LUSUARDI, a citizen of Italy, and resident of Rio de Janeiro, United States of Brazil, have invented certain new and useful Improvements in Registers, of which the following is a specification.

This invention relates to means for recording the excess pressure of steam or any other fluid in a boiler or any other vessel. Its object is the production of a register, which when applied to a steam boiler or other vessel and the like, records the number of times the said boiler or vessel has been subjected to an excess of pressure and also the amount of such excess. The invention provides means for accurately determining the abuse to which such boiler and the like has been subjected.

In the drawings, Figure 1 represents a front elevation partly broken away of an exemplification of the invention, Fig. 2 shows a partial section of Fig. 1 on the line 2, 2, Fig. 3 is an enlarged partial right hand side view of Fig. 2 with the cover plate removed and a partial section as on the line 3, 3, Fig. 4 represents a partial section of Fig. 3 on the line 4, 4, Fig. 5 shows a top plan view and section of Fig. 3 on the line 5, 5, Fig. 6 is a section of Fig. 3 on the line 6, 6, Fig. 7 shows a partial section of Fig. 3 on the line 7, 7, Fig. 8 represents a partial section of Fig. 3 on the line 8, 8, Fig. 9 shows a top plan view of Fig. 1 and Fig. 10 is a vertical axial section of a modified safety valve of the invention.

The invention is shown to comprise a safety valve with the nipple 20 having the lower threaded end 21, upper threaded end 22 and internal circular flange 23, the upper edge of which latter comprises a valve seat 24. The nipple can be engaged with a pipe fitting and the like extending from a boiler or other vessel with which it is to be used. A cylinder 25 with the openings or ports 29 in the body thereof is in threaded engagement with threaded end 22 of the nipple 20. A neck 26 with vents 45 extend from the body of the cylinder and has formed therewith a cap 27 with the central threaded opening 28. A threaded pressure regulator sleeve 30 with a hexagonal head 31 at its upper end and collar 32 at its lower end, is in engagement with the threaded opening 28. A lock nut 33 holds the sleeve 30 securely in place. The upper end of the internal

wall of the sleeve 30 is threaded for the guide bushing 34.

A piston rod 35 is located within the sleeve 30 and is guided by the bushing 34. The upper end of the said rod is threaded for the adjusting screw 36 having a head with the conical tip 37. At the lower end of the piston rod 35 is formed the double circular flange 39 from which extends the bearing pin 40. A supporting plate 41 is located upon the circular flange 39, and a spring 42 surrounds the piston rod 35 and bears on the plate 41. A spring cap 43 bears on the spring 42 and has extending up therefrom the circular flange 44, which latter is in engagement with the collar 32 of the sleeve 30. A piston 50 with the spring packing rings 51 is located within the cylinder 25. A disk 52 extends between the walls of said piston and has a central bearing for the pin 40. A circular flange 54 extends below the disk 52, and when the piston is in its lowest position bears on the valve seat 24. When the piston is in said lowest position its walls cover the openings 29 in the cylinder 25.

A recording gage is shown with a housing comprising a cylindrical shell 55 from which extends the front portion 56, having an oval opening with the oval flange 57, by means of which latter is supported an opaque glass front plate 59 with peep holes 60, 67, 68, 69, 77 and 78. A neck 61 extends from the shell 55 and has formed therewith the flange 62, that is bolted to the cap 27 of the neck of the cylinder 25, by means of screws 63 with the heads 64 that have openings for a wire 65, the ends of which are joined with a seal 66 or the like. Lugs 70 are formed with the wall of the shell 55 and are threaded for the screws 71 having the heads 72 with openings that support bolts 73, that are locked in place by the seals 74. The screws 71 have the flanges 75 formed with their heads which latter bear on and hold the rear cover plate 76 to the rear side of the shell 55. From the inner face of the front portion 56 of said shell 55 extend lugs 80, to which is bolted a frame plate 81 by means of the screws 82, 83. Openings 84 are formed in the said frame plate which register with the peep holes 60, 67, 68, 69, 77 and 78. Screw pivots 85 extend from the said frame plate and three pairs of toothed dial plates respectively 86, 87, 88, 89, 90, 91 are pivoted thereon. With the dial plates 86, 88, and

90 are respectively formed the ratchet wheels 92, 93 and 94. Washers 95 with the split pins 96 maintain the respective dial plates and ratchet wheels in place upon their screw pivots 85. From each of the dial plates 86, 88 and 90 extend the single teeth 97, 98 and 99, and each of the dial plates 87, 89 and 91 have formed in their circumferential edges the notches 100, 101, 102 located to register with the teeth 97, 98 and 99 of their accompanying dial plates. A scale with ten divisions is indicated by the numerals on each of the dial plates, said divisions can be of various denominations as pounds, kilograms, atmospheres and the like. Posts 105 and 106 extend from the frame plate 81 and the post 107 extends from the front portion 56 of the said shell 55. Springs 110 have each one of their ends fastened to the posts 105, 106 and 107 and their free ends are in the paths of the ratchet wheels 92, 93 and 94. A reciprocating supporting plate 115 has formed therein the slots 116, that engage screw guide pins 117 that extend up from separators that are fastened to the frame plate 81. Pawls 118, 119 and 120 are pivoted on screw-pins 121 extending up from the said plate 115. Stops 122 on the said plate are provided for the said pawls, and posts 123 support one end of each of the springs 124, 125 and 126, the free ends of which latter bear on the pawls 118 to 120. The tip ends of the said pawls can be brought into and out of engagement with the ratchet wheels 92, 93 and 94 respectively. A guide bracket 130 extends up from the inner face of the said front portion 56, in which is guided the reciprocating plunger 131, which has formed at its lower end the cap 132 with the upper face 133 and conical bearing face 134, that is engaged by the conical tip 37 of the adjusting screw 36. A collar 135 is formed at about the central portion of the said plunger 131, and a forked end 136 at its upper end carries the screw pivot 137. A lever 142 is pivoted on the screw pivot 143 extending from the separator 141 on the frame plate 81. An elongated guide 144 is formed at one end of the lever 142, which engages the pin 137. The other end of the lever 142 carries the screw pivot 145, by means of which connection is made with the link 146. The latter is in turn pivoted to the shifting lever 147, by means of the pin 148. The said shifting lever 147, contains the guide 149 near one end thereof, and the guide 150 adjacent to the other end. An eye 151 is formed at the end of the said shifting lever adjacent to the guide 150. A screw 152 is carried on the eye 151, and a washer 153 on the screw 152 clamps a spring 154 to the end of said shifting lever. The other end of the spring is clamped between a separator 155 encircling the screw 83 and a washer 156 located under the head

of said screw. A lug 160 extends up from the front portion 56, and on it is secured by means of the screws 161 one end of a guide bracket 162. The other end of the bracket 162 has a leg 163 which is fastened to the frame plate 81 by means of the screws 164. A screw pivot 165 extends from the bracket 162 and is engaged by the guide 149. The guide 150 of the shifting lever 147 is engaged by the screw pivot 166 extending from the supporting plate 115.

Referring to the modification shown in Fig. 10, the safety valve is shown to comprise the nipple 170 similar to the nipple 20, and having the seat 171. The cylinder 172 with the belt 173, having the openings or ports 174, is in threaded engagement with said nipple. A neck 175 with the vents 176 has formed therewith the cap 177. In a threaded opening 178 in said cap is engaged a pressure regulating sleeve 179, which is secured in place by the lock nut 180. A guide bushing 185 similar to 34 is carried in the sleeve 179. Said bushing guides a piston rod 186 to which is locked a piston 187 by means of the lock nut 188. The piston rod 186 extends through the said piston and engages a valve disk 189, the lower edge 190 of which bears on the valve seat 171. Guide lugs 191 extend up from the valve disk 189 and engage pins 192, extending from the lower face of the piston 187. A spring 193 bears on the inner face of said piston surrounding the piston rod 186, and is capped by the spring cap 194, which bears up against the lower edge of the regulating sleeve 179. An adjusting screw 195 is in threaded engagement with the upper end of the piston rod 186. The screw 195 coacts with the cap 182 of the register hereinbefore described. In the present instance a hood 196 is shown bolted to the cap 177 to be enabled to use the safety valve without said gage.

To use the invention with a steam boiler the spring 42 of the safety valve is compressed by means of the pressure regulating sleeve 30, so that its tension will maintain the piston 50 on its seat 24 until the allowable working pressure in the boiler is exceeded. When the pressure in the boiler exceeds the tension of the spring 42, the piston 50 rises which uncovers the ports 29 in the cylinder 25, allowing the escape of steam and at the same time the piston rod 35 rises, the plunger 131 rises with said piston rod, and the length of the stroke of the latter is controlled by the upper face 133 of the cap 132 and the collar 135. The movements of the plunger 133 are communicated to the lever 142, link 146 and the shifting lever 147, which latter swings on the screw pivot 165. The movements of said shifting lever are transmitted through the guide 150 thereof, to the screw pivot 166 extending from the reciprocating plate 115, and thereby the

latter is moved up against the tension of the spring 154. The plate 115 carrying the pawls 118, 119 and 120 in the paths of the teeth of the ratchet wheels 92, 93 and 94, the latter are thereby rotated upon the up strokes of said plate 115. The pawl 118 engages the ratchet wheel 92 for the first unit of excess pressure, the pawl 119 engaging the ratchet wheel 93 for the second unit, and the pawl 120 engages the ratchet wheel 94 for the third unit of excess pressure. Upon the down strokes of the reciprocating plate 115 the said pawls ride over the teeth of their ratchet wheels, and bear against the tension of the springs 124, 125 and 126. During the down strokes of the pawls the ratchet wheels are prevented from turning, by reason of the engagement of the springs 110 therewith. With the rotations of the said ratchet wheels their respective dial plates 86, 88 and 90 are correspondingly rotated, and the teeth 97, 98, and 99 of the latter engaging the notches 100, 101 and 102, rotation is communicated to the dial plates 87, 89 and 91. As the dial plates rotate the numerals of the scales thereon are exhibited through the peep holes of the glass front plate 59. The relation of the arms of the shifting lever 147 relatively to the screw pivot 165, and the movable elements connected with said lever and the spring 42, are proportioned so that when one predetermined unit of excess pressure has been reached in the boiler, the supporting plate 115 will cause the pawl 118 to have rotated the ratchet wheel 92, and its dial plate 86 an angular distance represented by one of the teeth of said ratchet. When two units of excess of pressure have been reached the pawl 119 will have rotated the ratchet wheel 93, and its accompanying dial plate 88, an angular distance represented by one of the teeth of the ratchet wheel 93. When three units of excess pressure have been reached, the pawl 120 will have rotated the ratchet wheel 94 with its accompanying dial plate 90 an angular distance represented by one of the teeth of the ratchet 94. It will be understood that the pairs of dial plates with their appurtenances could be increased, so that various excess units could be measured with the recording gage. When any of the dial plates 86, 88 and 90 have completed a revolution, the respective accompanying dial plates 87, 89 and 91 will have been rotated one-tenth of a revolution. Each dial has a scale thereon commencing with zero and terminating with the numeral 9, and one tooth extending from each of the dial plates 86, 88 and 90, and ten notches being formed on each of the dials 87, 89 and 91, the relative rotations of each pair of accompanying dial plates will be one to ten. The first pair of dial plates 86 and 87 measure one unit of excess of pressure. The second pair of dial

plates 88 and 89 measure two units of excess of pressure. The third pair of dial plates 90 and 91 measure three units of excess of pressure.

The observer in inspecting the numerals 70 visible through the transparent portions or peep-holes 60, 67, 68, 69 77 and 78 in the glass 81, will be able to readily read the number of times the different maximum predetermined units of pressure have been 75 exceeded. If the peep-hole 60 exhibits the numeral 9 and the peep-hole 67 exhibits zero, one unit of excess of pressure has been attained nine times. Should the peep hole 68 also exhibit a numeral as for instance 8 80 and peep-hole 69 exhibit zero, it would indicate that the two units of excess of pressure have been attained eight times. If the peep-hole 77 exhibits the numeral 2 and the peep-hole 78 exhibits zero it would indicate 85 that three units of excess of pressure have been attained twice. The numerals exhibited indicate exactly how many times these units of excess pressure have been attained. The apparatus thus is shown to 90 be an accurate register, of the number of times excessive pressure has been generated in the boiler or other vessel to which it is applied.

When the first pair of dial plates have 95 been actuated, that is to say when the dial plates 86, 87, have been turned a distance equal to one tooth of the ratchet wheel, consequent to an excess of pressure equal to one unit, the piston has been raised sufficiently 100 to allow a portion of the steam in the boiler to escape through the ports 29, and the pressure in said boiler will consequently be lowered to its normal working pressure. If 105 the pressure in the boiler reaches two or three units of excess pressure, the piston 50 will be proportionately raised and a greater volume of steam will escape by way of the ports 29, after which the said piston will descend and again close said ports, and the 110 normal pressure in the boiler will be resumed.

Having described my invention what I desire to secure by Letters Patent and claim is:

115 1. In a register the combination of a housing, a pair of dial plates pivoted in the housing and each having a scale, a tooth on one dial plate registering with notches of the other dial plate, a ratchet wheel connected 120 up with one of the dial plates, a reciprocating plate guided in the housing, a pawl pivoted on the reciprocating plate in the path of the teeth of the ratchet wheel, a shifting lever pivoted to the reciprocating plate, a 125 plunger guided in the housing, connections between the plunger and the shifting lever, a cylinder connected to the housing, a piston in the cylinder, a spring for the piston with the tension thereof opposing the pres- 130

sure of the fluid for which said register is employed and connections between said piston and said plunger.

2. In a register the combination of a housing, a plurality of pairs of dial plates pivoted in the housing and each pair of dial plates registering with each other, a shifting lever pivoted in the housing, connections between the lever and one of each pair of dial plates, a plunger guided in the housing, connections between the plunger and said shifting lever, a cylinder connected up with the housing, a piston in the cylinder subjected to the pressure of the fluid for which the apparatus is employed, a spring connected up with said piston with its tension opposing said pressure, a piston rod for said piston, a pressure regulating sleeve adjustably connected with said cylinder to adjust the tension of said spring and an adjusting screw carried by said piston rod bearing up against said plunger.

3. In a register the combination of a housing, a plurality of pairs of dial plates each having a scale pivoted in said housing, a tooth on one dial plate registering with notches of the other dial plate of each pair, a front plate having peep-holes to exhibit the numerals of the scales of the dial plates, a ratchet wheel connected up with one of each pair of dial plates, a reciprocating plate guided within the housing, a pawl pivoted on the reciprocating plate in the path of the teeth of each ratchet wheel, and located that one pawl is in engagement with its ratchet wheel while the others are released from their ratchet wheels, a shifting lever pivoted

to the reciprocating plate, a reciprocating plunger guided in the housing, connections between the plunger and the shifting lever, a cylinder connected to the housing, a piston within the cylinder, a spring connected with said piston with the tension thereof opposing the pressure of the fluid for which said register is employed and connections between said piston and said plunger.

4. In a register the combination of a housing, a plurality of pairs of dial plates pivoted in the housing and each pair of dial plates registering with each other, a shifting lever pivoted in the housing, connections between the lever and one of each pair of dial plates, a plunger guided in the housing, connections between the plunger and said shifting lever, a rear cover plate for the housing, means to seal the said cover plate with the housing, a cylinder connected up with the housing, means to seal the cylinder with said housing, a piston in the cylinder subjected to the pressure of the fluid for which the apparatus is employed, a spring connected up with said piston with its tension opposing said pressure, a piston rod for said piston, a pressure regulating sleeve adjustably connected with said cylinder to adjust the tension of said spring and an adjusting screw carried by said piston rod bearing up against said plunger.

Signed at Rio de Janeiro, U. States of Brazil this 15th day of July A. D., 1909.

AMILCARE LU SUARDI.

Witnesses:

D. LEUCHT.

A. CAUT.