

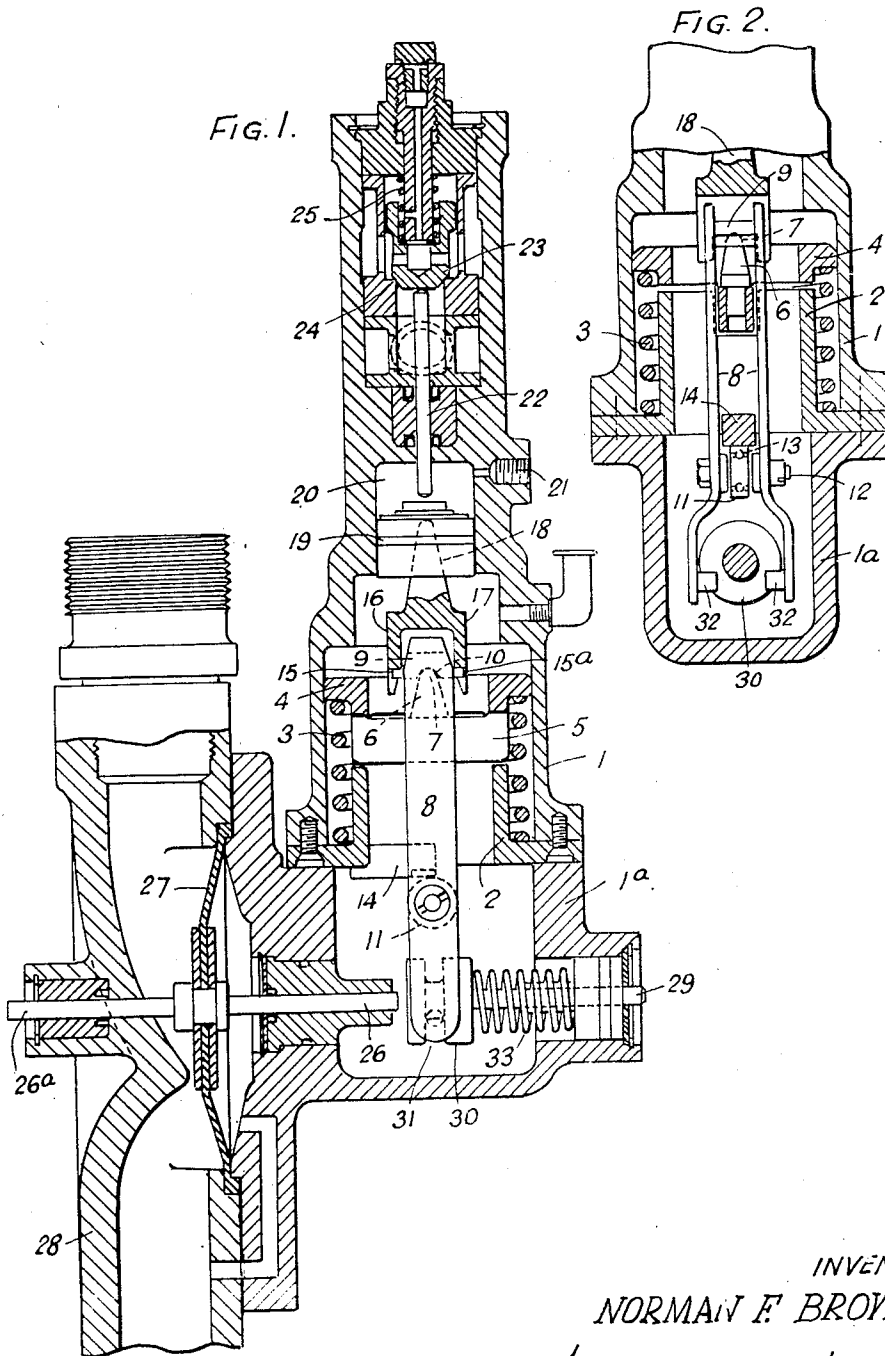
July 18, 1950

N. F. BROWN

2,515,291

TRIP MECHANISM

Filed Aug. 11, 1947



INVENTOR
NORMAN F. BROWN
by *Wilkinson Mawhinney*
ATTORNEYS

UNITED STATES PATENT OFFICE

2,515,291

TRIP MECHANISM

Norman Fraser Brown, London, England

Application August 11, 1947, Serial No. 767,947
In Great Britain July 4, 1946Section 1, Public Law 690, August 8, 1946
Patent expires July 4, 1966

3 Claims. (Cl. 74-2)

1

This invention relates to trip mechanism of the kind wherein a lever or arm is held by an abutment or latch device when the mechanism is set and is adapted to be actuated by spring means when the lever or arm is displaced to release it from the abutment or latch device.

It is an object of the present invention to provide an improved form of trip mechanism having means whereby the engagement and disengagement of the mechanism from the abutment or latch device is effected in a rapid and substantially frictionless manner thereby increasing the sensitivity of the mechanism.

According to the present invention the trip mechanism comprises a spring-actuated pivoted trip lever provided with a roller adapted to be positioned beneath a fixed abutment to hold the lever in set position with the actuating spring in stressed condition, the trip lever being released by displacing the roller relatively to the fixed abutment till the dead centre of the roller is past the outer edge of the abutment. The lever is pivotally supported on a member which is directly actuated by the spring and the roller is mounted on the lever in anti-friction bearings.

To enable the invention to be fully understood it will now be described with reference to the accompanying drawings, in which:

Fig. 1 is a sectional elevation of trip mechanism according to one embodiment of the invention, and

Fig. 2 is a fragmentary sectional side elevation taken at right angles to Fig. 1.

As shown in the accompanying drawing a casing 1 is provided having a sleeve 2. A coil spring 3 is located in the annular space between the casing 1 and sleeve 2 and its upper end abuts a flange of an annular member 4. The member 4 is provided with a cross bar 5 which reciprocates in slots in the sleeve 2 and carries a projection 6 formed with a ball-shaped free end 7. A trip lever is provided comprising spaced parallel plates 8 connected at the upper end by a cross piece 9 having a concave recess 10 to receive the ball-shaped end 7 of the projection 6 whereby the trip lever is pivotally supported. The opposite end of the lever has a roller 11 mounted between the plates 8 on a spindle 12 in anti-friction bearings 13. An abutment 14 extends from the sleeve 2 and the roller 11 is adapted to be positioned beneath this abutment to hold the trip mechanism in set position.

The crosspiece 9 at the upper free end of the lever has shoulders 15, 15a upon which rest the arms 16, 17 of a fork provided with an exten-

2

sion 18 having a ball-shaped free end which engages in a bearing recess in the underface of a piston 19, which is reciprocally mounted in a cylinder 20 formed in the casing 1. The cylinder 20 is provided with a bore 21 adapted to be connected with a conduit (not shown). A rod 22 extends into the cylinder 20 through a suitable gland, the upper end of the rod being adapted to engage with a valve 23 urged on to its seat 24 by a coil spring 25.

As shewn in the drawing, the trip mechanism is in set position with the roller 11 engaged beneath the abutment 14, and the upper face of the piston 19 spaced from the rod 22 and the valve 23 urged on to its seat 24 by its spring 25.

The trip lever may be released by any suitable means but as shewn in the drawing it is adapted to be released by a rod 26 connected with a flexible diaphragm 27 which is located in an education oil pipe 28 of oil pumping apparatus, such as described in British application No. 21,800/46.

The diaphragm is located in a constriction in the pipe 28 and the differential pressure set up by flowing oil is adapted to force the diaphragm 27 inwardly and actuate the rod 26 to engage and displace the trip lever to move the roller 11 until its dead centre is past the outer edge of the abutment 14, whereupon the roller will roll over the edge to release the trip and allow the trip lever to be forced upwards by the spring 3. The upward movement of the lever by the spring will also lift the fork 16, 17 resting thereon to raise the piston 19, and the rod 22 will accordingly be actuated to lift the valve 23 off its seat 24.

To reset the trip mechanism fluid pressure is supplied to the cylinder 20 by the conduit 21 to force the piston 19 downwardly to depress the fork and lever against the action of the spring 3.

When the lever is in released position, the roller 11 will rest against the outer face of the abutment 14 and accordingly the lever will be displaced laterally from the central longitudinal position, as shewn in the drawings, and as a result the shoulder 15 will be lowered and out of engagement with the adjacent arm 16 and the shoulder 15a raised and in engagement with the arm 17. The force exerted by the piston 19 to force the trip lever downwardly will accordingly be transmitted only by the arm 17 to the shoulder 15a and the force will therefore be applied along a line spaced laterally of and to one side of the longitudinal centre line of the trip lever. A resultant side thrust will accordingly be set up and the lever will be moved axially and also laterally towards the abutment 14, and the roller 11 will

automatically snap under the abutment when the trip lever has been moved downwardly sufficiently.

It will be understood that when the trip has been set, the supply of fluid pressure will be shut off and the conduit connected with the bore 21 opened to exhaust, to relieve the pressure in the cylinder 20.

In the arrangement here shown, an adjustable spring 33 may be provided in order to predetermine a minimum thrust from the diaphragm 27 necessary to actuate the trip so that it will not be prematurely actuated. Manual operation of the trip mechanism may be provided for either by an extension of the spindle 29 or by an extension of a spindle 26a through suitable glands, the spindle 29 being adapted to be pulled out, and the spindle 26a being adapted to be pushed in by hand against the thrust of spring 33 to release the trip lever.

The roller 11 being freely rotatable provides trip mechanism which is substantially frictionless in operation. Further, it is not necessary, when releasing the trip, to displace the lever until the whole of the roller 11 is freed from the edge of the abutment; the roller will roll over the edge when its dead centre position has passed the edge of the abutment. The mechanism has accordingly the important advantage that only a very small force is required to operate it to release the trip lever, and that that force can be conveniently determined by adjusting the compression of a spring.

Although the trip lever has been described as opening a valve when released, it may be adapted for actuating any desired form of mechanism. The trip mechanism is particularly adapted for use in oil well apparatus of the kind described in British application No. 21,800 of 1946 but is not, however, limited in this respect.

I claim:

1. Trip mechanism comprising a support, a trip lever including a pair of connected parallel spaced arms, means for pivotally mounting said arms on said support, a roller mounted between said arms at a point remote from said pivotal mounting, a fixed abutment extending between said arms for engagement by said roller to hold the trip lever in set position and spring means held in a loaded condition when the said lever is set and operative to actuate said arms when said roller is released from engagement with its said abutment and means actuated by fluid pressure for moving said trip lever to disengage said roller from engagement with said abutment.

2. Trip mechanism comprising a casing, a cylindrical recess in said casing, a piston in said recess, a support reciprocally mounted in said

casing beneath said piston, spring means connected with said support normally urging it towards said piston, a trip lever pivoted at one end to said support, a roller mounted on said trip lever at a position spaced from the said pivoted end, means connecting said lever and piston, a fixed abutment extending inwardly of said casing for engagement by said roller to hold the said trip lever in set condition stressing said spring means, said spring means being operative to raise the said support and the said trip lever and piston connected therewith when the roller is released from its abutment and means for supplying fluid pressure to said cylindrical recess in the casing to actuate the piston to move the support and trip lever downwardly to reset the trip mechanism.

3. Trip mechanism comprising a casing, a cylindrical recess in said casing, a piston in said recess, a support reciprocally mounted in said casing beneath said piston, spring means connected with said support normally urging it towards said piston, a trip lever pivoted at one end to said support, a roller mounted on said trip lever at a position spaced from the said pivoted end, means connecting said lever and piston, a fixed abutment extending inwardly of said casing for engagement by said roller to hold the said trip lever in set condition stressing said spring means, said spring means being operative to raise the said support and the said trip lever and piston connected therewith when the roller is released from its abutment and means for supplying fluid pressure to said cylindrical recess in the casing to actuate the piston to move the support and trip lever downwardly to reset the trip mechanism and means for deriving a lateral thrust from the said downward thrust as the said lever is moved downwardly by the said piston, automatically to re-engage the said roller with said abutment to reset the trip mechanism.

NORMAN FRASER BROWN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
224,254	Warne	Feb. 3, 1880
339,043	Coffee	Mar. 30, 1886
956,595	McKee	May 3, 1910
1,030,532	Pederson	Jan. 25, 1912
1,271,964	Waldow	July 9, 1918
1,532,212	Wilms	Apr. 7, 1925
1,782,664	Roe	Nov. 25, 1930
1,974,844	Cartwright	Sept. 25, 1934
2,454,189	Lentjes	Nov. 16, 1948