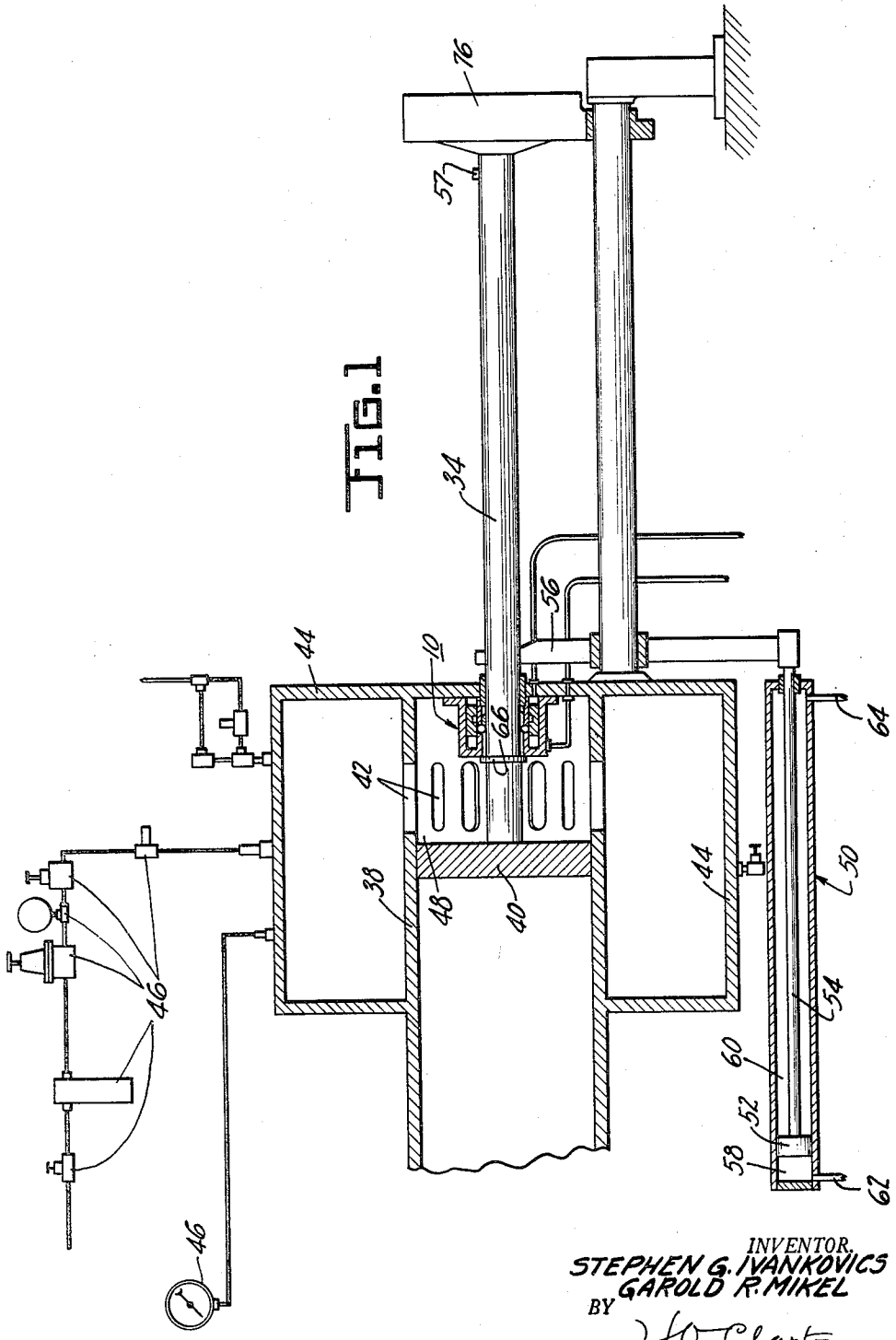
Aug. 23, 1960 S. G. IVANKOVICS ET AL 2,949,889

MOTOR OPERATED LATCH MECHANISM

Filed March 19, 1954 2 Sheets-Sheet 1

Fig. 1



INVENTOR.
STEPHEN G. IVANKOVICS
GAROLD R. MIKEL
BY
H. O. Clayton
ATTORNEY

Aug. 23, 1960 S. G. IVANKOVICS ET AL 2,949,889

MOTOR OPERATED LATCH MECHANISM

Filed March 19, 1954 2 Sheets-Sheet 2

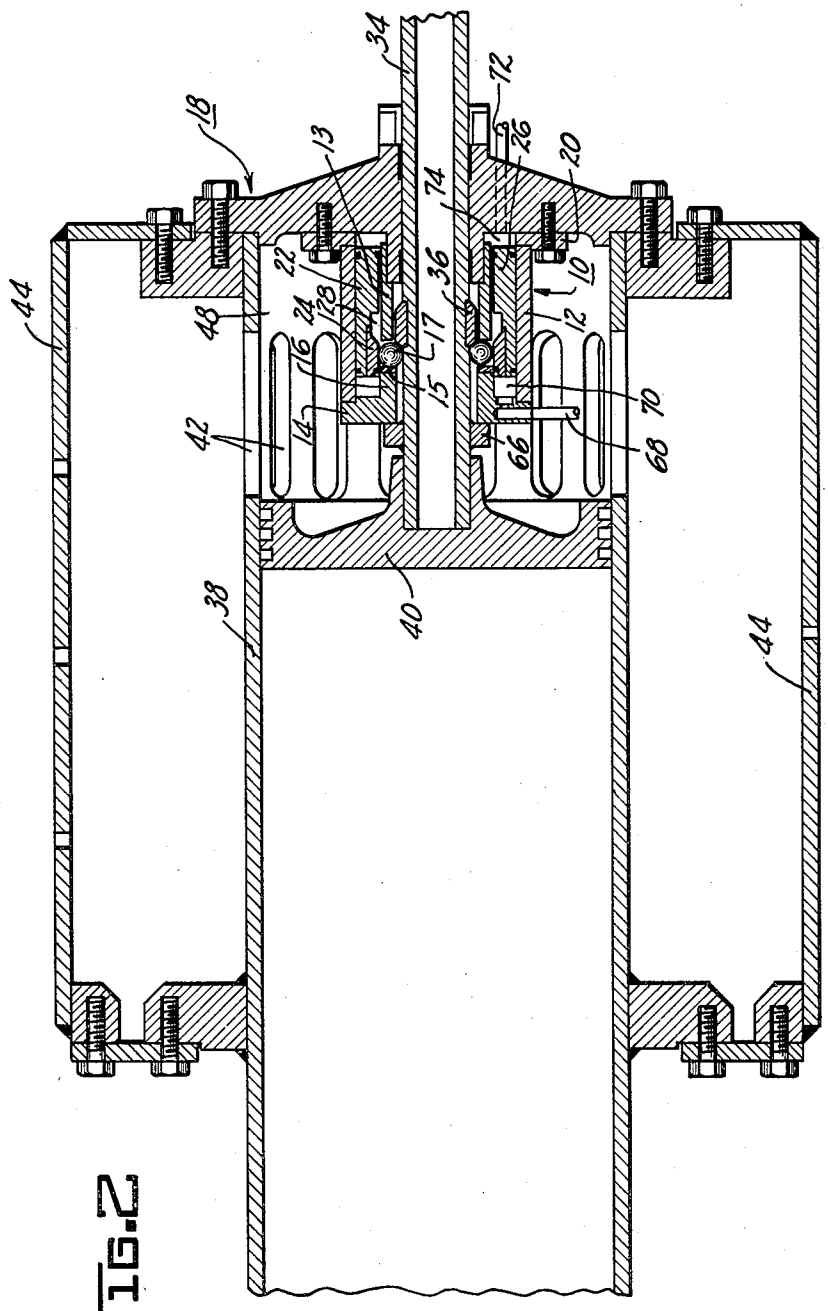


FIG. 2

INVENTOR.
STEPHEN G. IVANKOVICS
GAROLD R. MIKEL
BY H. O. Clayton
ATTORNEY

United States Patent Office 2,949,889 Patented Aug. 23, 1960

2,949,889

MOTOR OPERATED LATCH MECHANISM

Stephen G. Ivankovics and Garold R. Mikel, South Bend, Ind., assignors to The Bendix Corporation, a corporation of Delaware

Filed Mar. 19, 1954, Ser. No. 417,339

1 Claim. (Cl. 121—40)

This invention relates in general to locking means and in particular to a latch mechanism adapted to hold in place the power element of a loaded mechanism such as an energized pressure differential operated motor.

It is an object of our invention to provide a power operated latch mechanism for holding, in its ready to fire position, the power element of a loaded pressure differential operated firing motor.

Yet another object of our invention is to provide a double acting tubular shaped hydraulic latch motor the power element of which is adapted to actuate, that is move to their latching position, a plurality of latch elements; and another object of our invention is to combine, with the latch motor, a motor to be controlled by said latch motor the power element of the controlled motor being held in a certain position by the latch elements and serving, with an operation of the controlled motor, to return the latch elements to their inoperative position.

A further object of our invention is to provide a controlled pressure differential operated motor having a fluid receiving compartment outlined by a portion of the casing of the motor and the power element of the motor, said compartment housing a power operated latch mechanism, including a tubular pressure differential operated latch motor, a rod connected to the power element of the motor being slidably mounted within the tubular casing of the latch motor.

Another object of our invention is to provide an easily serviced and compact pressure differential operated latch mechanism of relatively few parts.

Other objects and features of the present invention will become apparent during the course of the following description, reference being had therein to the accompanying drawing in which:

Figure 1 is a view, largely in section, disclosing the latching mechanism of our invention adapted to control a pressure differential operated motor; and

Figure 2 is a sectional view disclosing the details of the latch mechanism of our invention.

There is disclosed, in the two figures of the drawings, one embodiment of our invention said embodiment including, in the broadest sense, means to be latched or locked in position and means to effect this operation. The latter means preferably includes a double acting hydraulic latch motor **10** comprising a tubular shaped casing member **12** having secured to one end thereof a flange **14** constituting one end of the motor. To the flange **14** there is secured a tubular shaped casing member **16** housed within the casing member **12**. A tubular shaped casing member **13** is spaced from the casing member **16** to provide an annular shaped opening **15** which receives ball latch members **17**. The casing of the motor **10** is, in the present embodiment of our invention and as is clearly disclosed in Figure 2, completed by a portion of a hereinafter described fluid pressure motor **18**, that is the controlled motor of our invention. In the present embodiment of our invention the motor **10** is secured to

the aforementioned motor **18** by a ring member **20** said member being secured to the casing of the motor **18**.

Continuing the description of the latch motor **10** a tubular shaped power element or piston member **22** is reciprocable within the casing of said motor said power element being reduced in diameter at one end thereof to receive a cam like ring member **24** of relatively hard material. The member **24** and a large diametered portion **26** of the piston member **22** together outline an annular recess **28** in the power element to receive the ball latch members **17**. These latch members are moved outwardly by the ring **24** when the piston **22** is moved to the right, Figure 2, thereby more completely forcing said latch members into the annular shaped opening **15**. In this operation the balls **17** are moved into contact with the outer face of a hollow piston rod **34** and with a ring **36** of relatively hard material secured to said rod. The ring **36** in contacting the balls **17** serves as a stop means to prevent a leftward movement, Figure 2, of the piston **40** when said balls are in their latching position; and said ring also serves as a cam to force the balls **17** into the motor **10**.

Describing now the controlled portion of the mechanism of our invention the aforementioned fluid pressure motor **18** includes a casing **38** and a piston or power element **40** reciprocable therein. The casing is provided with a plurality of openings **42** therein said openings registering with a housing member **44**. This member **44**, or so-called accumulator, houses a power fluid, such as air, under pressure and the pressure of the air and ingress and egrees of the same to and from the accumulator is controlled by a plurality of valves and other instruments **46**, Figure 1, constituting no part of our invention.

The controlling latch motor **10** and latch elements **17**, together with the controlled motor **18**, in other words all of the mechanism disclosed in this application are disclosed in the Herron et al. application for U.S. Patent No. 448,098 filed August 5, 1954, now U.S. Patent No. 2,810,288.

Describing now the operation of the mechanism of our invention and incidentally describing elements thereof not heretofore described, the controlled fluid pressure motor **18**, which may be termed a firing motor, is primed, that is conditioned in its ready to fire state, by the necessary operation of controls including the controls **46**. By this operation the pressure of the air in the accumulator **44** and a compartment **48** of the motor **18** are built up to say 100 p.s.i. Now immediately prior to and in preparation for this operation the piston **40** is moved to and locked in the position disclosed in two figures of the drawing this operation being effected by the operation of the latch motor **10** and by the energization of a double acting fluid pressure motor **50**, Figure 1, constituting no part of our invention. Describing the latter motor and its operation, a power element **52** thereof and a rod **54** connected to said power element are moved to the right, Figure 1, a yolk member **56** connected to the rod **54** serving to abut a stop member **57** secured to the rod **34**; and this operation serves to move the piston **40** to the ready to fire position disclosed in the drawings. The motor **50** includes fluid receiving compartments **58** and **60** to which are connected conduits **62** and **64** respectively, said conduits being connected to a valve mechanism, not shown, operative to control the ingress and egress of power fluid, preferably oil, to and from the compartments **58** and **60** depending on the direction of motion desired of the power element of the motor. After the piston **40** of the controlled motor **18** has been placed in its ready to fire position the motor **50** is energized to return the yolk **56** to the position disclosed in Figure 1. It is also to be noted that the rightward movement of the piston **40** is limited by a stop **66** secured to the rod **34**

said stop moving into abutment with the flange portion **14** of the casing of the motor **10**.

After the power element of the firing motor **18** is placed in its ready to fire position the latch motor **10** is energized to move the piston **22** thereof to the right to the position disclosed in the drawings. This operation is effected by the operation of a valve mechanism, not shown, said mechanism controlling the flow of power fluid, preferably oil, via a conduit **68** into a compartment **70** of the latch motor. Simultaneous with this operation oil is forced, via a conduit **72**, from a compartment **74** of the motor **10**. As described above the balls **17** or latch elements of our invention are now positioned to lock the piston **40** in its ready to fire position; for they then are contacted by the stop ring **36**.

The motor **18** is now ready to be fired whereupon the operator operates the control valve mechanism of the latch motor **10** to move the power element **22** to the left oil under pressure entering the motor compartment **74** and flowing from the compartment **70**; and this operation releases the then energized motor **18** the piston **40** thereof moving rapidly to the left, Figure 2, and pulling with it say a guided missile or other device **76** being tested said device being secured to the rod **34**. In this operation the latch balls **17** are forced back into the recess **28** in the piston **22** said balls being then completely housed within the latch motor.

The firing operation having been completed, the motor **50** is then again energized to move the piston **40** back to its ready to fire position and the latch motor **10** is then again energized to position the latch members **17** in their operative position. The motor **50** is then energized to return the yolk **56** to its off position and the motor **18** is again primed with air under pressure thereby completing the operation of preparing the mechanism for another firing operation.

There is thus provided a relatively simple and compact power operated latching mechanism including a controlled device, such as the motor **18** and the controlling mechanism such as the latching motor **10** and latch members **17**. The latching motor and latch members operated thereby may however be used as a latch mechanism for

other devices than the motor **18** disclosed in the drawings; for the casing of the motor **10** may be secured to other mechanisms to be controlled, the latch members **17** then serving to temporarily hold or latch a member in position.

We claim:

The combination with a single acting pressure differential operated motor comprising a cylindrical casing, a reciprocable power piston located in said casing and having a piston rod connected to said piston and extending through an end wall of said casing, of a cylindrical latch casing mechanism surrounding said piston rod and having one end mounted on an end wall within said motor casing, said latch casing having an opening adjacent to said rod, a movable latch member located in said opening, a reciprocable fluid actuated sleeve member located in said latch casing and having means for presetting and releasing said latch, including a recess formed in the sleeve intermediate the ends thereof adapted to receive the latch, a latch setting member mounted on said rod and located adjacent to the opening in said latch casing and in engagement with said latch member at the time of presetting by the return movement of said sleeve, manually controlled fluid pressure means for pressurizing the sleeve in one direction to release the latch and in the opposite direction to preset said latch, and a stop member mounted on the rod and spaced from said latch setting member for engaging the latch casing to effect positioning of said latch setting member.

References Cited in the file of this patent

UNITED STATES PATENTS

1,503,280	Osbourne	July 29, 1924
1,956,110	Turrettini	Apr. 24, 1934
2,393,962	Ashton	Feb. 5, 1946
2,632,425	Grover	Mar. 24, 1953

FOREIGN PATENTS

48,981	Sweden	Aug. 24, 1917
443,871	Great Britain	Mar. 5, 1936
573,033	Great Britain	Nov. 2, 1945