

July 15, 1947.

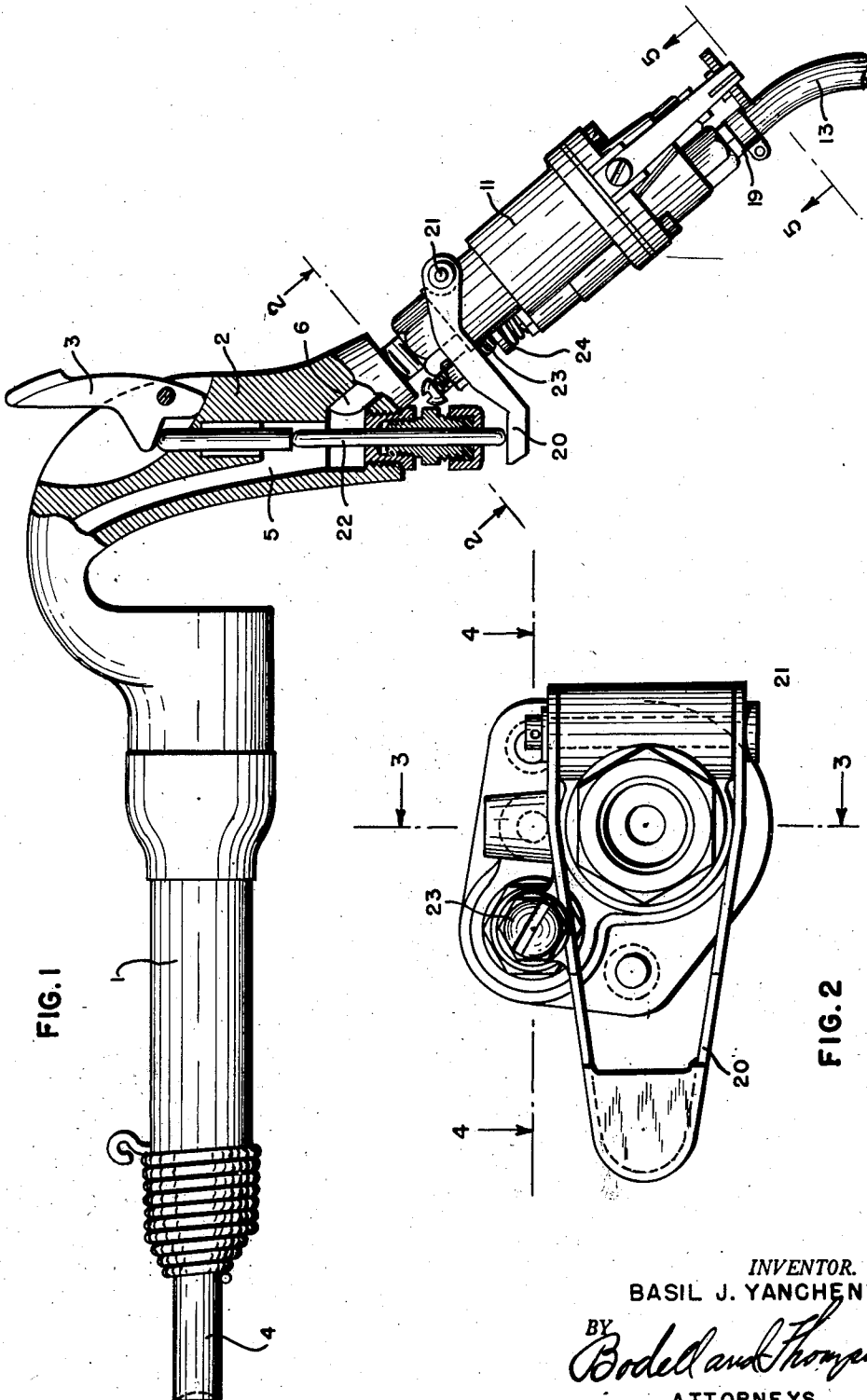
B. J. YANCHENKO

2,423,920

TIMER FOR RIVETERS

Filed Dec. 4, 1943

3 Sheets-Sheet 1



INVENTOR.
BASIL J. YANCHENKO

BY
Bodell and Thompson
ATTORNEYS

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3 Sheets-Sheet 2

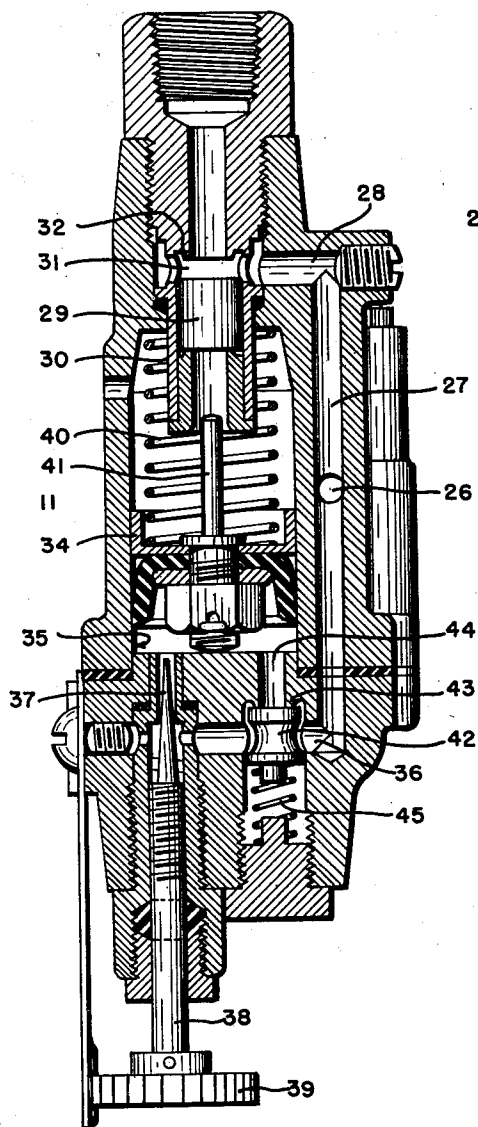


FIG. 3

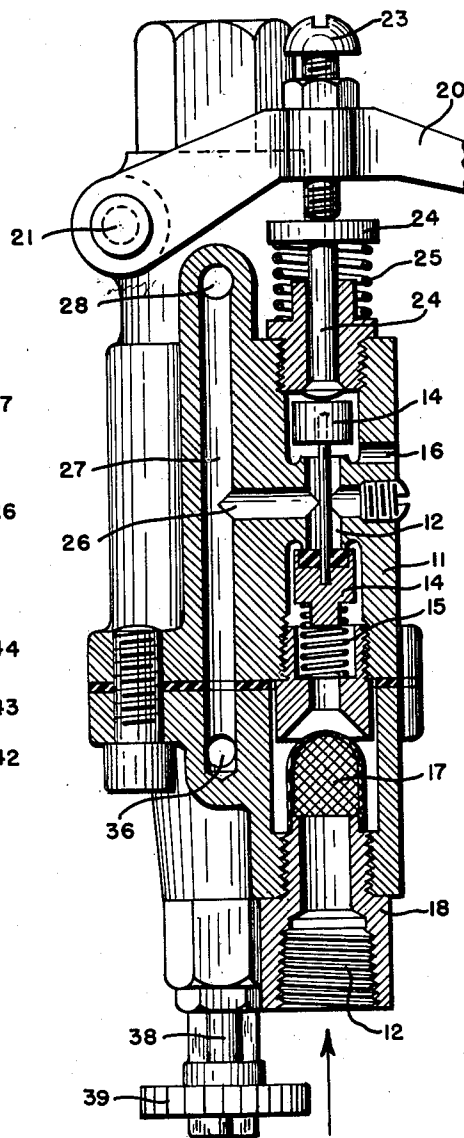


FIG. 4

INVENTOR.
BASIL J. YANCHENKO

BY
Bodell and Thompson
ATTORNEYS

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FIG. 5

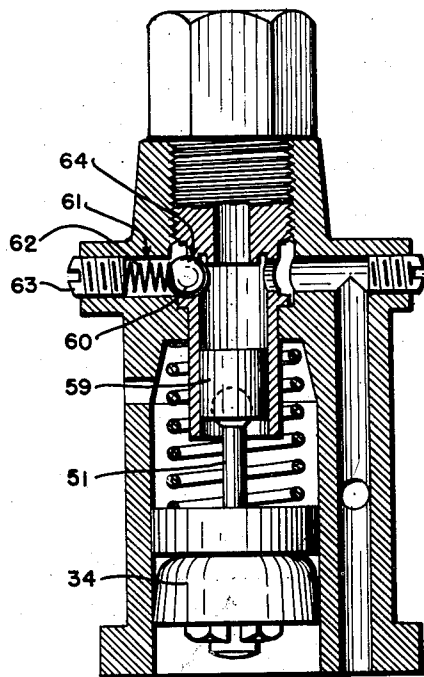
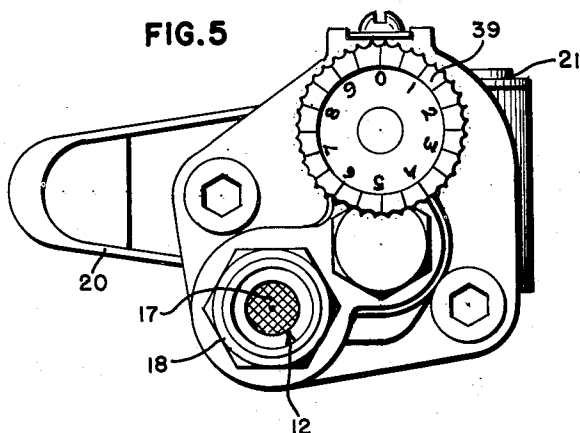


FIG. 6

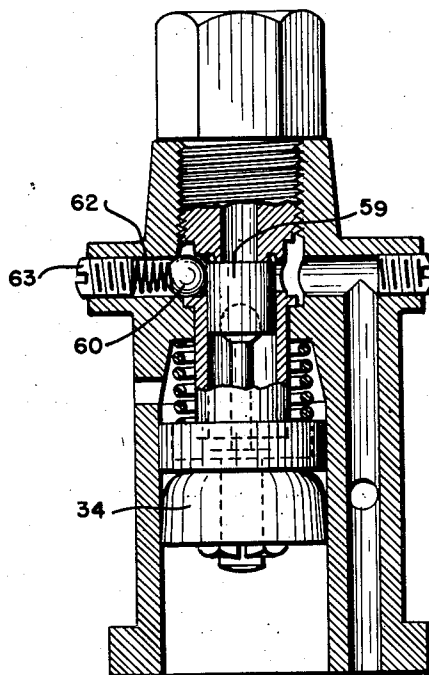


FIG. 7

INVENTOR.
BASIL J. YANCHENKO

BY
Bodell and Thompson
ATTORNEYS

UNITED STATES PATENT OFFICE

2,423,920

TIMER FOR RIVETERS

Basil J. Yanchenko, Syracuse, N. Y., assignor, by
mesne assignments, to G. A. Braun, Inc., Syra-
cuse, N. Y., a corporation of New York

Application December 4, 1943, Serial No. 512,885

8 Claims. (Cl. 137-139)

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This invention relates to timers for timing the period of operation of a pneumatic machine, or the number of operations performed by the machine upon one operation of an operating or control member or trigger, and more specifically for timing the number of blows delivered during each operation of the trigger by a riveting machine. It has for its object a pneumatic timer having a means which automatically closes cut-out valve by a snap action in contradistinction to a gradual or follow-up action after a predetermined time period or number of operations.

The invention consists in the novel features and in the combinations and constructions hereinafter set forth and claimed.

In describing this invention, reference is had to the accompanying drawings, in which like characters designate corresponding parts in all the views.

Figure 1 is a side elevation, partly in section, of a riveter equipped with the timer.

Figure 2 is an enlarged end elevation of the timer, or a sectional view taken on the plane of line 2-2, Figure 1, parts being omitted, showing the timer in end elevation.

Figures 3 and 4 are sectional views taken at a right angle to each other on the planes of lines 3-3 and 4-4, respectively, Figure 2.

Figure 5 is an opposite end elevation from that shown in Figure 2, or a sectional view on line 5-5, Figure 1.

Figures 6 and 7 are fragmentary sectional views similar to Figure 3 of a riveter showing a modified form of the mechanism for causing the snap action or snap closing of the cut-out valve, Figure 6 showing the snap catch in its normal position, and Figure 7 the snap catch when pushed out by the build up of pressure to its unlocked position.

This timer comprises, generally, a body or casing having a valve controlled inlet for air under pressure, the valve being operated by the trigger or operating member of the machine or riveter, to which the timer is applied, a transfer passage leading from the valve controlled inlet passage to an outlet coupled to the air inlet passage of the pneumatic mechanism of the machine or riveter to which the timer is applied, a normally open cut-out valve for closing said outlet, the cut-out valve being operated to closed position by pressure from the transfer chamber through a pressure regulating valve, whereby the pressure operating to close the cut-out valve is gradually built up to a predetermined pressure and means for causing the cut-out valve to close with a snap action, when that predetermined pressure is reached.

1 designates the pneumatic machine to which the timer is applied, this being shown as a riveter having a pistol grip handle 2 and controlled by a trigger 3, the riveter having a suitable pneu-

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matically operated tool or head or hammer 4 operated by pneumatic means within the barrel or body 1. The air is supplied to the mechanism of the riveter through a passage 5, here shown as extending through the pistol grip 2, the passage 5 having an inlet end at 6 for coupling to a source of air. The outlet of the timer is coupled to this inlet passage 2. The riveter itself forms no part of this invention.

11 designates the body of the timer, this being formed with an inlet passage 12 for coupling through a suitable conduit or hose 13 with a source of supply of compressed air, this passage 12 extending lengthwise of the body 11 and having a two-way or combined intake and exhaust valve 14 therein, which is self-closing, as by a spring 15. This valve is normally arranged with its intake head closed and its exhaust head open, to permit the air to exhaust back from the tool or riveter through the exhaust passage 16 to the outer air. The intake end of this passage 12 is provided with a suitable filter 17 carried by a plug 18 which is threaded or formed with the coupling section for connecting a coupling-piece 19 at the end of the air hose to the inlet passage of the timer. The valve is operated to open position against its returning spring 15 by a suitable means, as a lever 20, in the form of a yoke arranged astride the body 11 and pivoted at 21 thereto, this lever being operated by the trigger 3 through suitable means, as a push rod 22, extending lengthwise of the pistol grip 2. The lever 20 is provided with a suitable set screw 23 which coacts with the head of a plunger 24 guided in a plug threading into the adjacent end of the intake passage 12, the stem thrusting against the exhaust valve head of the valve 14. A spring 25 acts on the plunger 24 to retract the lever 20 and trigger 3 to normal position, when the trigger 3 is released. The valve controlled inlet passage 12 communicates through a transfer passage 26 with the outlet 27 of the timer, this outlet being coupled at 28 to the inlet end 6 of the passage 5 in the pistol grip 2.

29 designates the cut-out valve of the timer, this being shown as a sliding piston valve located in a guide 30 and arranged to move crosswise of the branch 31 of the transfer passage 28 toward its seat at 32 at the entrance end of the outlet passage 28 of the timer. The face of the piston valve 29 is thus exposed to pressure within the branch 31 and the outlet 28 and hence the pressure tends to return the valve to open or starting position. This valve 29 is pressure-operated to closed position by pneumatic means operated by air coming through a bypass from the transfer passage 26 and through a pressure regulating valve. The pneumatic means here illustrated includes a piston 34 working in a piston chamber or cylinder bore 35, the piston and the bore being

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axially aligned with the piston valve 28. The piston chamber on the pressure side of the piston communicates with the transfer chamber 26 through a by-pass 36 having a pressure regulating valve 37 therein, the outlet end of the regulating valve discharging into the piston chamber 38. The pressure regulating valve is provided with a suitable adjustable metering pin 38 extending to the outside of the casing, where it is provided with an adjusting wheel 39. The movement of the piston 34 by the air building up in the piston chamber behind it through the pressure regulating valve is against the resistance of a returning spring 40.

In the form shown in Figures 3 and 4, the means for closing the cut-out valve 29 with a snap action comprises a lost motion connection between the piston 34 and the valve 29. As the valve 29 and the piston 34 are axially aligned, this means is shown as a lost motion connection arranged to be taken up when the piston 34 has traveled a predetermined distance and hence pressure built up behind it to nearly the predetermined pressure, when the motion is taken up between the piston and the cut-out valve 29, it is further retarded and stopped momentarily due to the resistance offered to the closing of the valve 29 by the air pressure against it. As here illustrated, the lost motion connection between the piston 34 and the valve 29 is provided by a push rod 41 extending in advance of the piston 34 and normally spaced from the rear face of the cut-out piston valve 29 and located to come into engagement therewith, when the piston has traveled a predetermined distance and the pressure behind it built up. Now, as the motion of the piston is additionally momentarily retarded, the pressure continues to build up through the pressure regulating valve to an extent whereby it overcomes the air pressure on the face of the valve 29 presented to the air in the passages 26, 27 and the pressure of the spring 40, and hence closes the valve 29 with a quick or snap action. The number of operations of the riveter or the time it requires for the pressure to build up to perform this function may be adjusted by regulating the metering pin 38.

For the purpose of effecting a quick exhaust of the air from the piston chamber 38, when the operator releases the trigger 3, a pressure-operated check valve is provided by-passing the pressure regulating valve, this being here shown as a valve head 42 normally closed on its seat 43 in position to close an exhaust passage 44 from the piston chamber 34, the valve being held against its seat by a spring 45. The valve 42 extends transversely of the passage 36 and is formed with an annular groove or duct permitting the air to flow from the transfer passage 26 around the valve head 42. When, however, the operator releases the trigger 3, thus closing the intake valve 14 and opening the exhaust valve head thereof, the piston 34 is returned to its starting position by its spring 40, thus forcing the air through the exhaust passage 44 with sufficient pressure to open the check valve 42, so that the air exhausts quickly back through the transfer chamber into the passage 12 and out through the exhaust port 15.

In the forms shown in Figures 6 and 7, the snap action is effected by a controlled resistance instead of by a lost motion between the piston 34 and the cut-out valve 29.

In Figures 6 and 7, the push rod 51 thrusts directly against, without lost motion, or is coupled

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to, the cut-out valve 59 so that the valve 59 moves gradually toward its seat as the pressure behind the piston 34 builds up through the pressure regulating valve. However, as the cut-out valve 59 approaches its seat, it encounters a spring resistance which momentarily stops its movement, so that the pressure builds up behind the piston 34 to an extent that causes the valve 59 to suddenly overcome its spring resistance and close with a snap action. The spring resistance is here shown as a spring-pressed poppet or ball 60 located in a passage 61 and pressed into operative position by a spring 62 located between the ball and a plug 63 closing the outer end of the passage.

The inner end of the passage is contracted to prevent undue displacement of the ball from its seat 64. The ball, however, projects beyond its seat into the path of the cut-out valve 59. When the cut-out valve 59 moves from the position shown in Figure 6 into a position, whereby it contacts the ball 60, the pressure builds up behind the piston 34 to an extent whereby the pressure overcomes the resistance of the ball 60, and also any resistance on the face of the piston valve 59, causing it to close against its seat with a snap action, and in so doing, displacing the ball or poppet into the position shown in Figure 7.

In either form of the invention, the cut-out valve is closed with a snap action. The time for closing or the number of operations of the riveter may be varied by adjusting the metering pin 38.

The subject matter of this invention is similar to that of my pending application, Serial Number 476,976, filed February 24, 1943. The difference, however, is the closing of the cut-out valve with a snap action.

What I claim is:

1. In a timer, the combination of a casing having an inlet passage for a motive fluid, and an outlet passage, the inlet passage having a self-returning combined intake and exhaust control valve therein normally arranged with its intake closed and its exhaust open, a transfer passage between the valve and the outlet, a normally open cut-out valve operable to close the outlet, and pressure-operated means in the timer operated by the pressure of the air in the transfer passage for controlling the last valve including means for causing the cut-out to close with a snap action.

2. In a timer, the combination of a casing having an inlet passage for a motive fluid, and an outlet passage, the inlet passage having a self-returning combined intake and exhaust control valve therein normally arranged with its intake closed and its exhaust open, a transfer passage between the valve and the outlet, a normally open cut-out valve operable to close the outlet, a pressure-operated member, connecting means between it and the cut-out valve tending to close the cut-out valve, a pressure regulating valve to control the flow of motive fluid to the pressure-operated member, the cut-out valve having a pressure face located so that the pressure of the air passing the open cut-out valve tends to hold it open, and means for holding the cut-out valve from closing movement and from movement with the piston until the pressure through the pressure regulating valve has built up to a predetermined amount.

3. In a timer, the combination of a casing having an inlet passage for a motive fluid, and an outlet passage, the inlet passage having a self-returning combined intake and exhaust control valve therein normally arranged with its intake closed and its exhaust open, a transfer passage

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between the valve and the outlet, a normally open cut-out valve operable to close the outlet, a pressure-operated member, means between it and the cut-out valve for transmitting the movement of said member to the cut-out valve, to close the cut-out valve, a pressure regulating valve to control the flow of motive fluid to the pressure-operated member, the cut-out valve having a pressure face located so that the pressure of the air passing the open cut-out valve tends to hold it open, and means for delaying the closing movement of the cut-out valve until the pressure through the pressure regulating valve has built up to a predetermined amount, the delaying means including a lost motion connection between the pressure-operated member and the control valve.

4. In a timer, the combination of a casing having an inlet passage for a motive fluid, and an outlet passage, the inlet passage having a self-returning combined intake and exhaust control valve therein normally arranged with its intake closed and its exhaust open, a transfer passage between the valve and the outlet, a normally open cut-out valve arranged in position to, when operated, close the outlet and having a face presented to the pressure of fluid in the outlet, a piston chamber, a piston in the chamber, a by-pass connecting the transfer passage and the piston chamber on the pressure side of the piston and having a pressure regulating valve therein, means for yieldingly restraining the movement of the piston by the air pressure passing through the by-pass, and means for transmitting the motion of the piston to the cut-out valve causing the closing of the cut-out valve by the piston to be momentarily delayed and held from movement with the piston until the pressure in the piston chamber through the bypass has built up to a predetermined amount.

5. In a timer, the combination of a casing having an inlet passage for a motive fluid, and an outlet passage, the inlet passage having a self-returning combined intake and exhaust control valve therein normally arranged with its intake closed and its exhaust open, a transfer passage between the valve and the outlet, a normally open cut-out valve arranged in position to, when operated, close the outlet and having a face presented to the pressure of fluid in the outlet, a piston chamber, a piston in the chamber, means for transferring the movement of the piston to the cut-out valve including a lost motion connection permitting the piston to be moved by the air pressure relative to the cut-out valve before the lost motion is taken up, a by-pass connecting the transfer passage and the piston chamber on the pressure side of the piston and having a pressure regulating valve therein, and means for yieldingly restraining the movement of the piston by the air pressure passing through the by-pass.

6. In a timer, the combination of a casing having an inlet passage for a motive fluid, and an outlet passage, the inlet passage having a self-returning combined intake and exhaust control valve therein normally arranged with its intake closed and its exhaust open, a transfer passage between the valve and the outlet, a normally open cut-out valve arranged in position to, when operated, close the outlet and having a face presented to the pressure of fluid in the outlet, a piston chamber, a piston in the chamber having a rod operable to close the cut-out valve, a by-

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pass connecting the transfer passage and the piston chamber on the pressure side of the piston and having a pressure regulating valve therein, means for retarding the movement of the piston by the air pressure passing through the by-pass, the piston being connected to the cut-out valve to press against the same as the air pressure builds up behind the piston chamber and a snap restraining device for holding the cut-out valve for movement until a predetermined pressure is built up behind the piston.

7. In a timer, the combination of a casing having an inlet passage for a motive fluid, and an outlet passage, the inlet passage having a self-returning combined intake and exhaust control valve therein normally arranged with its intake closed and its exhaust open, a transfer passage between the valve and the outlet, a normally open cut-out valve arranged in position to, when operated, close the outlet and having a face presented to the pressure of fluid in the outlet, a piston chamber, a piston in the chamber having a rod operable to close the cut-out valve, a by-pass connecting the transfer passage and the piston chamber on the pressure side of the piston and having a pressure regulating valve therein, means for retarding the movement of the piston by the air pressure passing through the by-pass, the piston being connected to the cut-out valve to press against the same as the air pressure builds up behind the piston chamber, and a snap restraining device for holding the cut-out valve from movement until a predetermined pressure is built up behind the piston, said device being arranged to coact with the cut-out valve when the piston approaches the end of its throw.

8. In a timer, the combination of a casing having an inlet passage for a motive fluid, and an outlet passage, the inlet passage having a self-returning combined intake and exhaust control valve therein normally arranged with its intake closed and its exhaust open, a transfer passage between the valve and the outlet, a normally open cut-out valve operable to close the outlet, pressure-operated means in the timer operated by the pressure of the air in the transfer passage for controlling the last valve including means for causing the cut-out valve to close with a snap action, means operable on the pressure-operated means to return said means to starting position when the pressure therein is released, and an exhaust valve for the pressure-operated means opened by the pressure of the returning means when the control valve is returned to normal position.

BASIL J. YANCHENKO.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
2,067,064	Platz	Jan. 5, 1937
1,956,962	Ringle	May 1, 1934
1,801,069	Boker	Apr. 14, 1931

FOREIGN PATENTS

Number	Country	Date
689	Great Britain	1870