

March 6, 1951

W. M. TENER
ELAPSED TIME RECORDER

2,543,946

Filed Dec. 16, 1947

2 Sheets-Sheet 1

Fig. 1

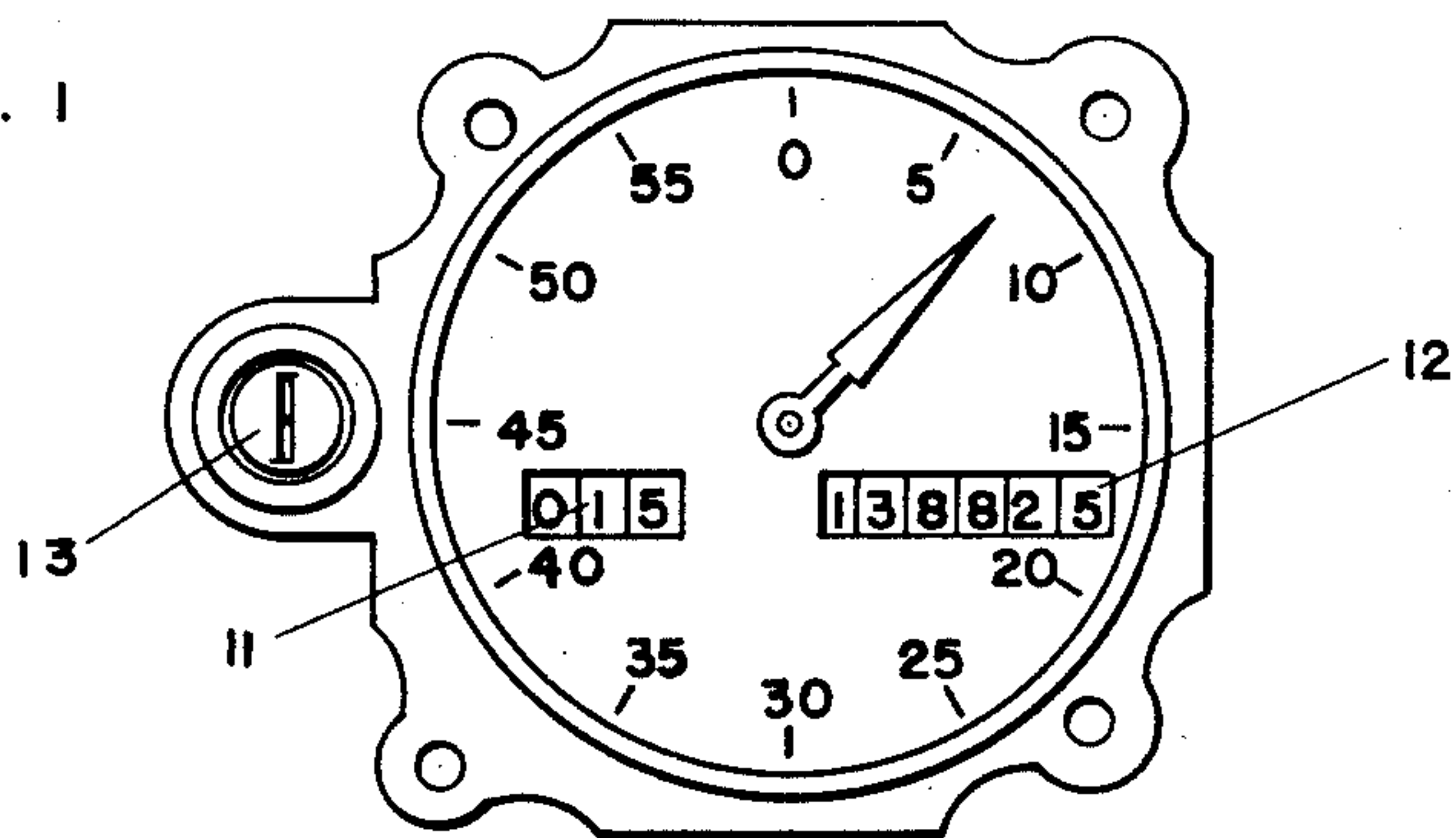
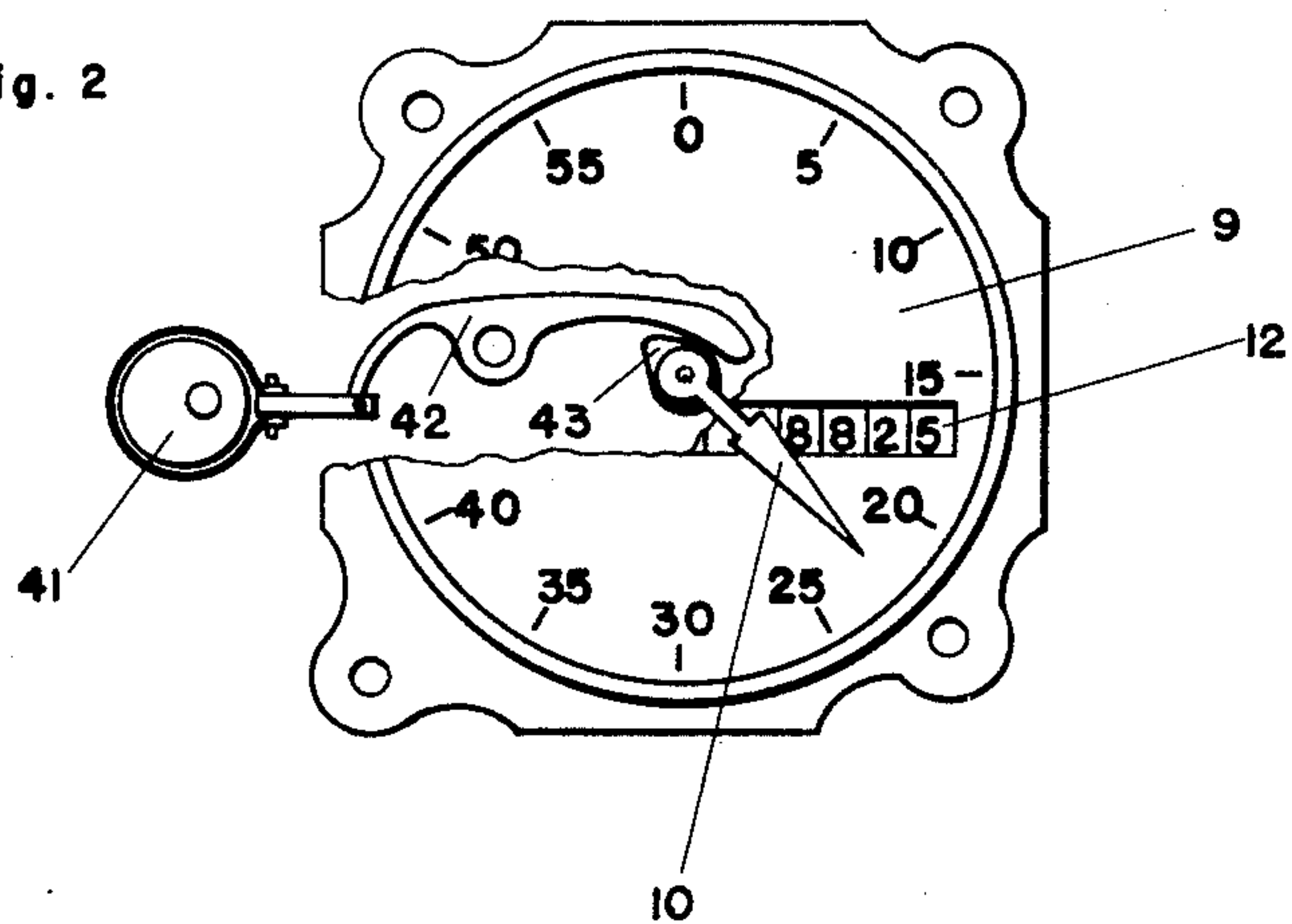


Fig. 2



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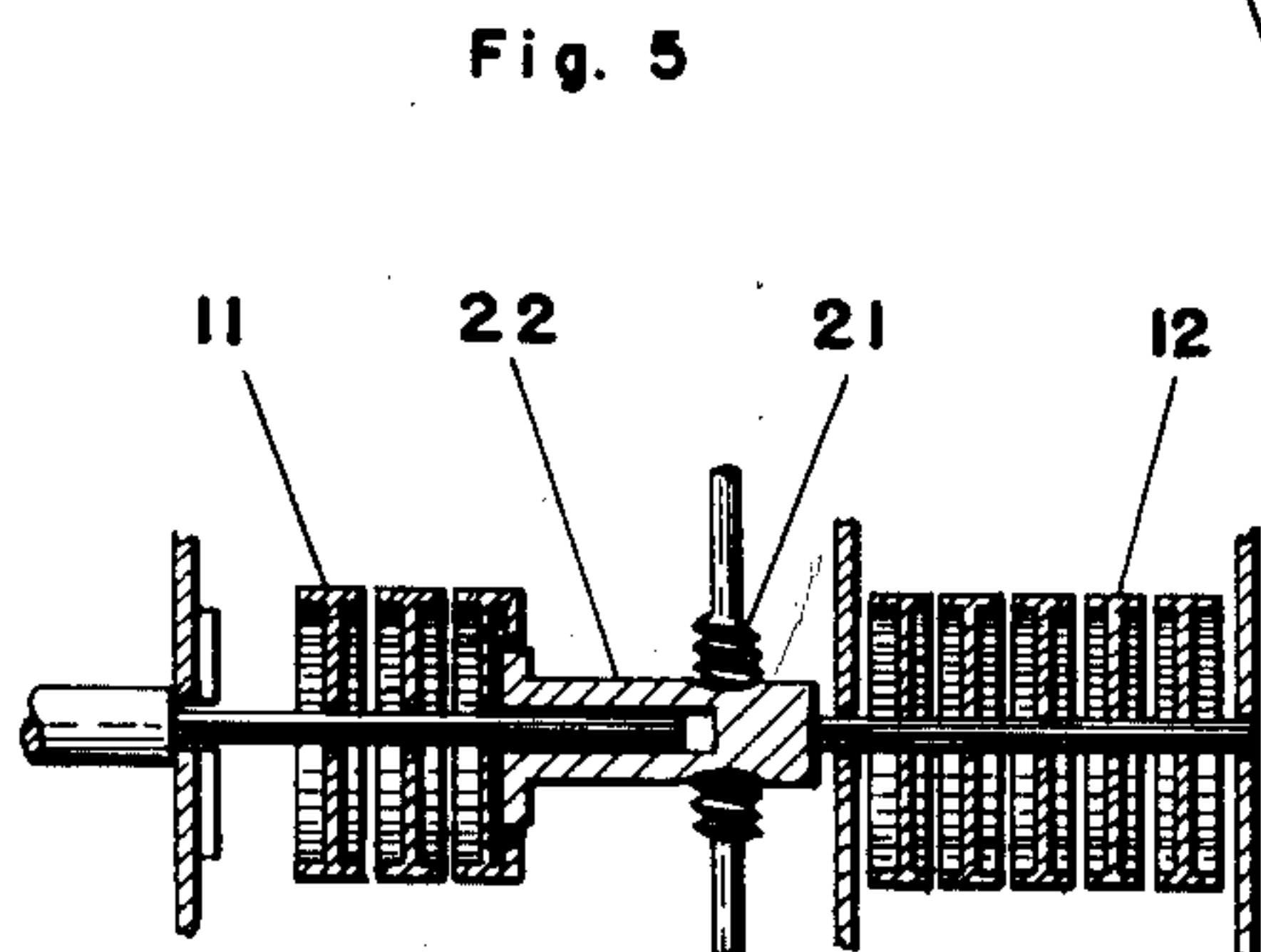
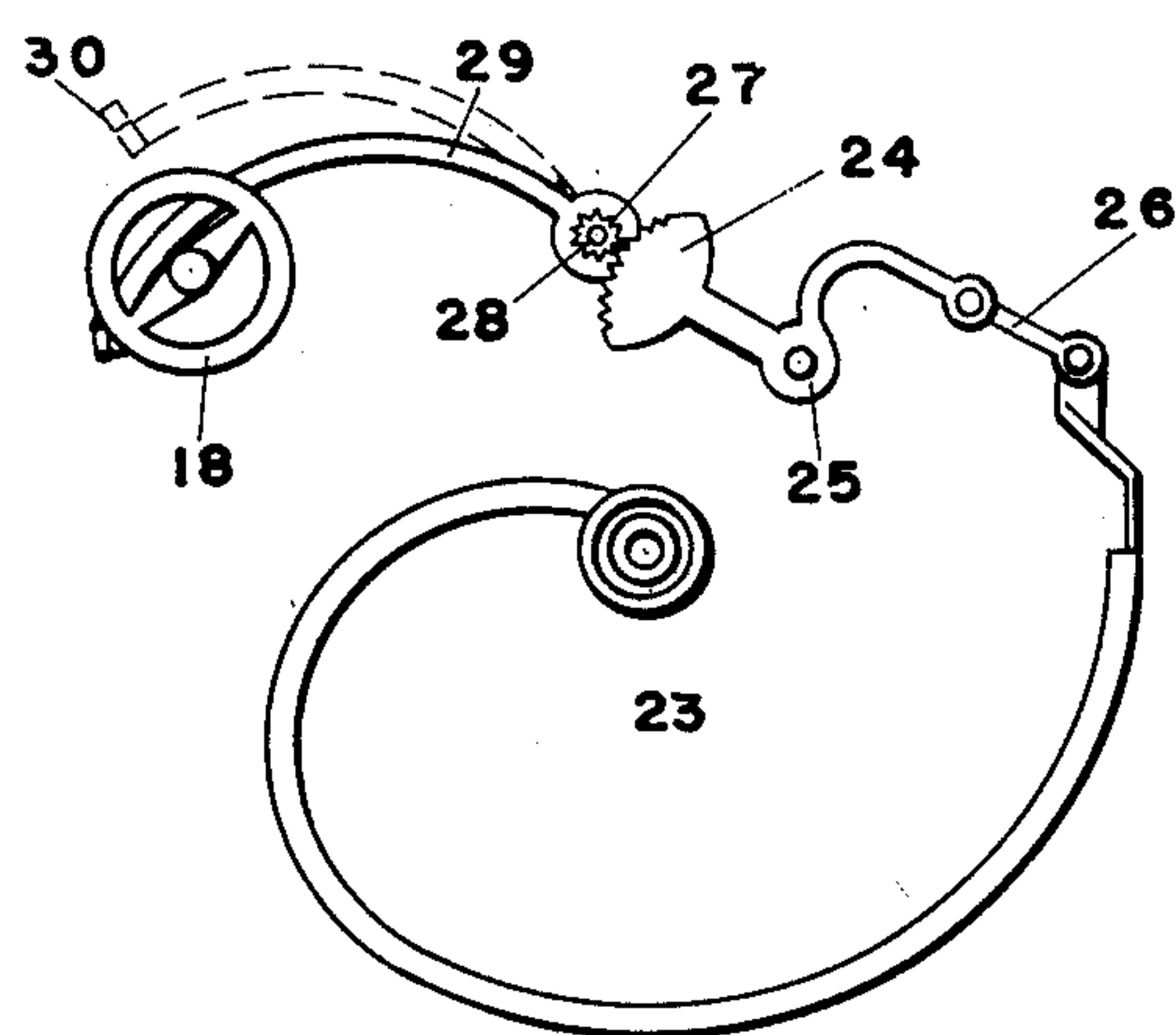
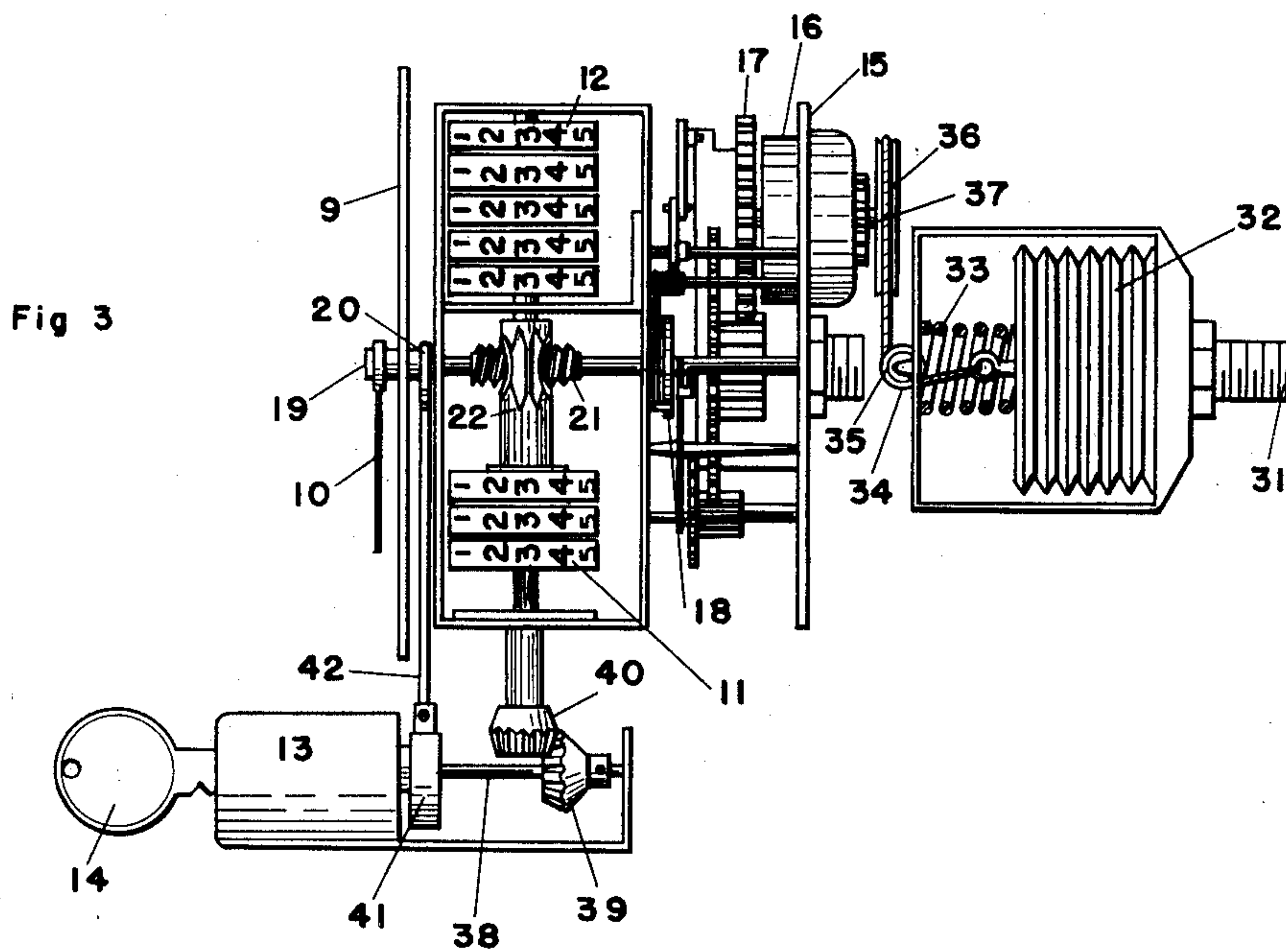
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UNITED STATES PATENT OFFICE

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ELAPSED TIME RECORDER

Wallis M. Tener, Richmond, Va.

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6 Claims. (Cl. 161—15)

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This invention relates to a time recorder for airplanes and more particularly to a recorder which operates during the engine operating hours of an airplane.

The invention is particularly adapted to the small rental plane, particularly at a field which has only a few planes and at which the burden of keeping books and an accurate check of flying time is sometimes the difference between running the field at a profit and a loss. The rented airplane is generally rented by the hour both for cross country and local flights. A person making a trip must pay full price for hours when the plane is idle the same as while flying, or the airport operator must take the person's word and lose money. This invention makes it possible to accurately record only the time during which the plane is in operation, and thus be fair to both operator and customer.

The object of the invention is to provide a clock which will register the hours and minutes of flight and which will be fully automatic in operation and which can be locked to prevent unauthorized tampering.

A further object of the present invention is to provide a clock operated to register the minutes and hours of an airplane's operation on any single flight and to also make a permanent record of the total operating hours of the airplane and engine.

It is a further object of the present invention to provide a clock which may be started and stopped by means of the pressure in the oil line of an ordinary internal combustion engine and which may be wound from the same pressure.

A further object of the present invention is to provide a mechanism which may be attached to an airplane to maintain a record of the number of hours said plane is in use and which may be easily adjusted to record the time that the engine is running or to only include such time as the plane is in the air.

With the foregoing and other objects in view, the invention resides in the novel arrangement and combination of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein described may be made within the scope of what is claimed without departing from the spirit of the invention.

The invention is shown in the accompanying drawings in which:

Figure 1 is a front elevation of the timekeeping recorder together with the case.

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Figure 2 is a similar view broken to show the resetting mechanism.

Figure 3 is a cross sectional view.

Figure 4 is a detail view of the balance wheel stopping and starting device.

Figure 5 is a cross sectional view showing the ratchet advancing mechanism for the trip drums.

Referring particularly to the drawings, a case 8 has mounted therein a dial 9 having a minute track and a minute hand 10. A resettable register 11 shows the hours for any particular trip and a permanent register 12 registers to 99,999 operating hours. A lock 13 for the insertion of a key 14 provides untamperable means for the resetting of the mechanism which will be hereinafter explained.

An ordinary clockwork mechanism mounted on a pillar plate 15 shows a mainspring 16 operating through a train of gears 17 to drive a balance wheel 18. The hand 10 is mounted directly on the shaft 19 which is driven off of the third gear, all of which is ordinary watch construction. Located just back of the dial 9 and on the shaft 19 is a heart cam 20, while still further along the shaft a worm 21 drives a worm gear 22 and operates the recording drums 11 and 12.

Connected directly to the oil pressure line of the motor is a tube 23 which when the pressure is built up due to the operation of the engine tends to expand outwardly moving the gear 24 about the pivot 25 through the link mechanism 26 and turning the pinion 27 which through the shaft 28 lifts the arm 29 moving the spring finger 30 across and away from the balance wheel 18. This gives the balance wheel 18 a slight kick and starts the clock running. It will continue to run until the pressure in the oil line ceases and the finger 30 again contacts the balance wheel 18 to stop the clock mechanism, thus keeping an elapsed time record of the operation of the engine.

Also connected to the oil line at 31 is a bellows 32 having attached thereto a spring 33 and a cable 34. The cable 34 passes over a pulley 35 and is attached to a wheel 36 having a controlling ratchet wheel 37. Operation of the bellows by reason of pressure in the oil line compresses the spring 33 and permits the wheel 36 to ratchet loosely on its shaft by the action of a return spring (not shown) so that cessation of pressure in the oil line causes the spring 33 to return the bellows to the position shown in Figure 3 moving the cable and the wheel 36 to wind the clock mainspring a sufficient amount to maintain the clock in a wound condition.

The lock mechanism 13 has attached thereto

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a shaft 38, a bevel gear 39 which meshes with a bevel gear 40 at right angles thereto and a cam 41 carrying a lever 42. Insertion of the key and turning same causes the bevel gears to return the drums 11 to a zero position and brings the finger 43 of the lever 42 into engagement with the heart shaped cam 20 and returns the minute hand to its zero position. This gives an initial setting for each and every flight of a plane which is entirely under the control of the owner of the plane and which provides him with quick means of recording the exact number of hours during which the plane was in operation.

What is claimed is:

1. A time recorder for operating engines having a pressure oil system comprising a clock mechanism, means operated through the oil pressure line for releasing the balance wheel of the clock mechanism starting the operation of said mechanism, means connected to said oil pressure line for automatically winding said clock mechanism, a recording hand and drums for indicating the elapsed time and a key operated means for resetting the recording mechanism to zero.

2. A time recorder for operating engines having a pressure oil system, comprising a clock mechanism, means operated through the oil pressure line for releasing the balance wheel of the clock mechanism starting the operation of said mechanism, a spring operated rewinding mechanism for said clock mechanism, means operated by the oil pressure for compressing and releasing said spring, a recording hand and drum for indicating the elapsed time and a key operated means for resetting the recording mechanism to zero.

3. A time recorder for operating engines having a pressure oil system, comprising a clock mechanism, means operated through said pressure oil system for starting said mechanism, a spring means for rewinding said mechanism, a bellows connected to said spring and to said oil pressure line for compressing and releasing said spring, a recording hand and recording drums for registering a single trip, key operated means for resetting said hand and drum and a non-resettable drum recording mechanism for maintaining a permanent record.

4. A meter for airplanes comprising a clockwork mechanism, an arm engaging the balance wheel of said mechanism, means controlled by the oil pressure of said airplane engine for actuating said arm to stop and start said balance wheel, means actuated by said oil pressure for winding said clockwork mechanism, means for recording the running time of said clockwork

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mechanism and key operated means for returning said recording means to zero position.

5. A meter for airplanes comprising a clockwork mechanism, including a mainspring and balance wheel, an arm actuated by the oil pressure of said airplane engine and adapted to be swung into and out of contact with said balance wheel to stop or start said clockwork mechanism, the path of movement of said arm being such as to kick said balance wheel into motion to insure starting of the mechanism, a spring opposed operated bellows actuated by said oil pressure, a ratchet wheel attached to said mainspring, a cable connection between said ratchet wheel and said bellows so that movement of said bellows under the influence of said oil pressure will wind said mainspring, indicating drums actuated by said clockwork mechanism to record the running time of said mechanism and key operated means for returning said recording drums to zero position.

6. A time recorder for operating engines having an oil pressure system, comprising a clock mechanism, means operated through the oil pressure line for releasing the balance wheel of the clock mechanism and starting the operation of said mechanism, means connected to said oil pressure line for automatically winding said clock mechanism, a permanent elapsed time recorder and a resettable elapsed time recorder operating off of said clockwork mechanism, gears connected to said resettable mechanism, a shaft connected to said gears, a lock mechanism connected to said shaft whereby turning of a key will operate said gears to reset said resettable mechanism to zero, a heart cam carried on the clockwork minute and hour hand shaft, a cam mounted on said locked mechanism shaft, means connecting said lock mechanism shaft cam with said heart cam whereby movement of the key and lock mechanism will reset the clock mechanism to zero.

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