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MAY 25, 1943. RETRACTABLE TAIL LANDING GEARS FOR AIRCRAFT 430,970

BY A. P. C. Filed Feb. 14, 1942

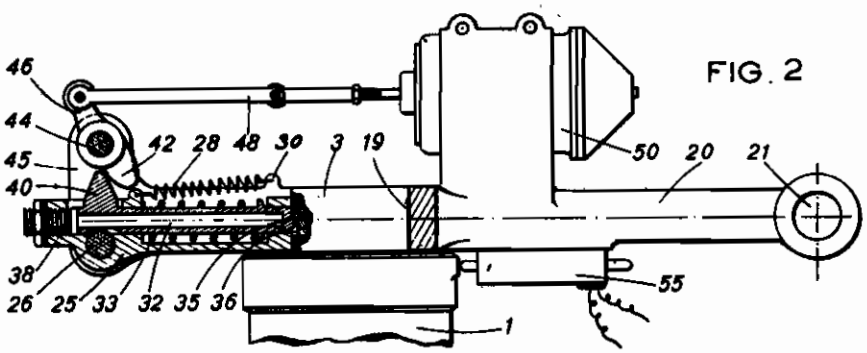


FIG. 2

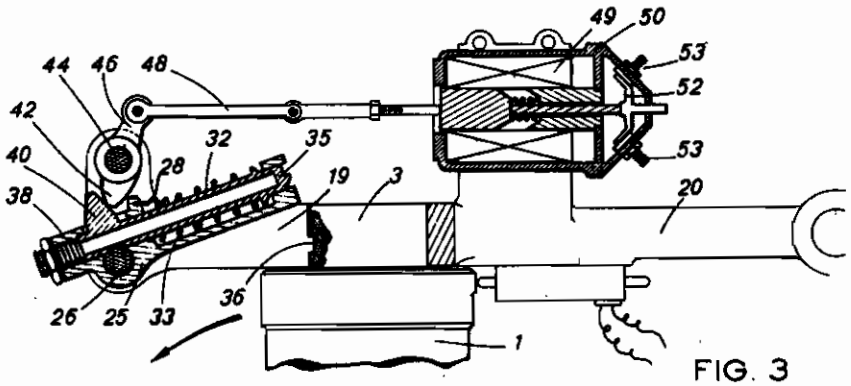


FIG. 3

FIG. 1

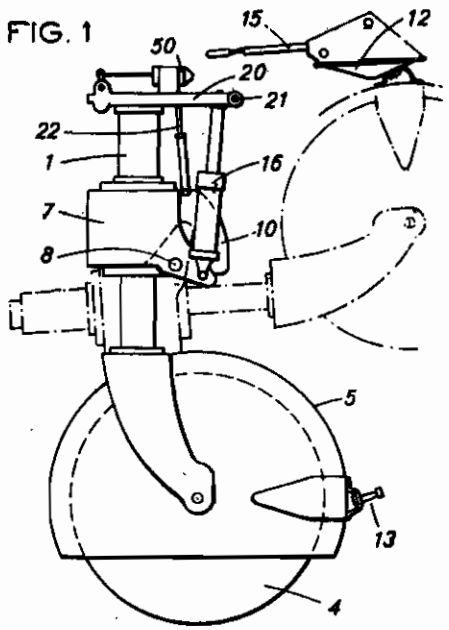
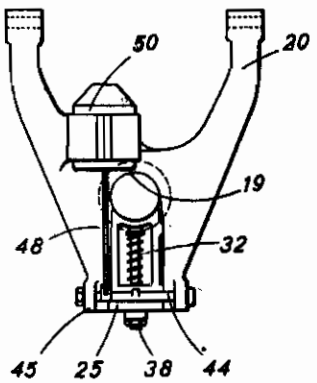


FIG. 4



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RETRACTABLE TAIL LANDING GEARS FOR AIRCRAFT

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This invention relates to retractable tail landing gears for aircraft of the kind comprising a wheel or the like carried by a supporting frame, acting as a shock-absorber, and mounted as to be able to swing between a low or working position and a high or retracted position in response to the operation of a suitable controlling means; and more particularly to the landing gears of this type in which said controlling means comprises a spring device (pneumatic jack or the like) which is constantly under tension and accumulates energy during the lifting movement in order to restore it during the lowering movement, and locking systems for assuring the maintaining of the supporting frame in either position.

In such tail landing gears, it is important that the locking system for locking the supporting frame in its low position be not only able to firmly and safely maintain the supporting frame when the aircraft rolls on the ground but that it be able to easily unlocking said frame when it is desired to retract the landing gear to its high position after taking-off.

It has been suggested, in view of effecting this locking, to use a tilting member, pivoted to turn around a horizontal axis to the aircraft structure, for capping the end sheath of the supporting frame in its working position. A safe locking may thus be obtained. However, in view of the fact that the end sheath of the supporting frame applies with great pressure upon the supporting area of this tilting member when transmitting to the latter the strains to which said frame is subjected, the power necessary for lifting said tilting member and unlocking said frame may attain considerable values.

One of the objects of this invention is to remove the drawbacks of the known devices and to provide a locking system which is of simple construction, which safely maintains the landing gear in working position and which requires but a small power for unlocking the supporting frame in order to effect the lifting thereof.

In accordance to this invention, the sheath end of the supporting frame in working position is held pressed against the bottom of a substantially horizontal U-shaped or the like socket formed in a bracket member, by a spring device, and is retained in this position by a block closing at least partially the opening of said socket, said block being urged towards its working position but being adapted to be retracted, preferably by a swinging motion, on the one hand automatically, near the end of the lowering travel of the landing gear, so as not to hinder the lowering of said gear to its working position, and on the other hand in response to the operation of a controlling device, when the gear is operated for lifting.

According to a feature that this invention may further embody, said block is combined with a locking bolt co-operating with the sheath of the supporting frame for locking automatically these two parts together as the gear reaches its low position.

A single control preferably assures successively the retraction of the bolt and that of the block.

This single control may be so correlated with that of the gear lifting mechanism that the latter operates only subsequent to the retraction of the block.

In a preferred embodiment, the locking bolt is carried by the block and an electromagnet operates a rocking cam which co-operates with the tail of said bolt and is so shaped that, responsive to the cam, said tail causes the bolt to slide and retract until arrested by an abutment, and then to swing together with said block, a contactor being preferably provided for closing the circuit of the lifting mechanism at the end of the travel of said electro-magnet.

Other features and advantages of the invention will moreover be apparent from the description hereinafter given as an example with reference to the annexed drawing, in which:

Fig. 1 is a schematic elevational view of a tail landing gear according to this invention;

Figs. 2 and 3 show at a larger scale, partially broken, the device for holding the gear both in working position and in retracted position;

Fig. 4 is a plan view of this device.

In accordance with the embodiment shown, the landing gear comprises a supporting frame 1, acting as a shock absorber, the upper part of which terminates into a cylindrical sheath 3 and the lower part of which carries a landing wheel 4, protected by a mudguard 5. The supporting frame 1 is mounted in a clamp collar 7 keyed to the shaft 8 of the lifting mechanism, of any suitable type, contained in a housing 10, by means of which mechanism said frame can be lifted to its high position, shown by chain dotted lines in Fig. 1.

The frame 1 is held in its high position by a locking device consisting of a keeper 12, a co-operating finger 13 carried by the mudguard and a hand controlled operating device 15 for disengaging the keeper.

A spring device, such as the pneumatic jack 16, which is constantly under tension and accumulates power during lifting, is connected to the clamp collar 7 so as to control the lowering of the landing gear. The whole device may be of any known type and will need no further description.

In the working position, the landing gear comes to rest at the bottom of a horizontal U-shaped socket 19 and is held pressed against said bottom by the jack 16. The socket 19 is formed in a bracket member 20 supported by a shaft 21 mounted on the structure of the aircraft, said bracket being locked relatively to the housing 10 by means of an arm 22, of adjustable length. The U-socket 19 is closed on the open side by a block or shoe member 25 the inner end of which is shaped to conform with the sheath 3 in working position. Said block 25 is fulcrumed on a pivot pin 26 located across the limbs which define the socket 19 in bracket 20 and secured at the end thereof to said bracket. A spring 28 located between one ear of the block 25 and a projection 30 on member 20 urges said block in the direction of its working position. A longitudinal bore provided in the block 25 serves as a guide for a sliding bolt 32 the head 35 of which is urged outwardly by a spring 33. The bolt head 35 co-acts with a slot or groove 36 provided on one side of sheath 3.

The sliding movement of the bolt 32 towards the rear is limited by an adjustable abutment formed by the end of a screw 38 co-operating with a screwthread provided in the block 25 beyond the bolt 32. The latter has a tail 40 projecting upwardly and co-operating with a rounded cam 42 keyed to a pivot 44. This pivot is supported vertically above the pivot 28 by a pair of ears 45 on bracket 20 and carries one arm 46 to which is pivoted a link 48 connected with the core of an electromagnet 49 the frame of which is flanged to the bracket 20. Said core is integrally connected with a contactor 52 adapted to bridge two contacts 53 at the end of its travel, said contacts being mounted in series in the control circuit of the lifting mechanism. A plunger switch 55 attached to the bracket 20 is adapted to be closed by the frame 1 when the sheath 3 comes to rest at the bottom of socket 19.

The relative positions and sizes of the various elements are such that the energizing of the electromagnet responsive to the operation of the landing gear lifting mechanism causes the landing gear to operate as follows, starting from its low position, as shown in Figs. 1 and 2, where it is pressed against the bottom of the socket 19 by the constantly tensioned jack 16.

In the first part of the core travel the cam 42 repels the tail 40, which causes the bolt 32 to slide until it engages with the abutment screw 38, thereupon said cam imparts to the block 25 a swinging movement around its pivot, this being facilitated by the rounded form of the cam. The parts are then in the position shown in Fig. 3 and, on reaching the end of its travel, the magnet core bridges the contacts 53, thus closing the circuit of the landing gear lifting mechanism. When the landing gear reaches its high position in which it remains locked, as shown in Fig. 1, the control circuit is opened, the block then returning to its low position under spring action.

To lower the gear, the control 15 is operated in view of unlocking same, when the jack 16 or the like brings it back to its working position. As the sheath 3 engages with the block 25, said block will be lifted thereby against the action of spring 28 and as said sheath comes into rest at the bottom of socket 19, the block 25 falls back and the bolt 35 is then projected into the groove 36 by its spring 33. The landing gear is thus locked in its low position.

At the same time, the contactor 55 also effects the closing of a circuit for controlling an indicator device of any suitable type.

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