July 15, 1930. R. I. MARKEY 1,770,756

TAIL SKID

Filed Aug. 30, 1928 2 Sheets-Sheet 1

Fig. 1.

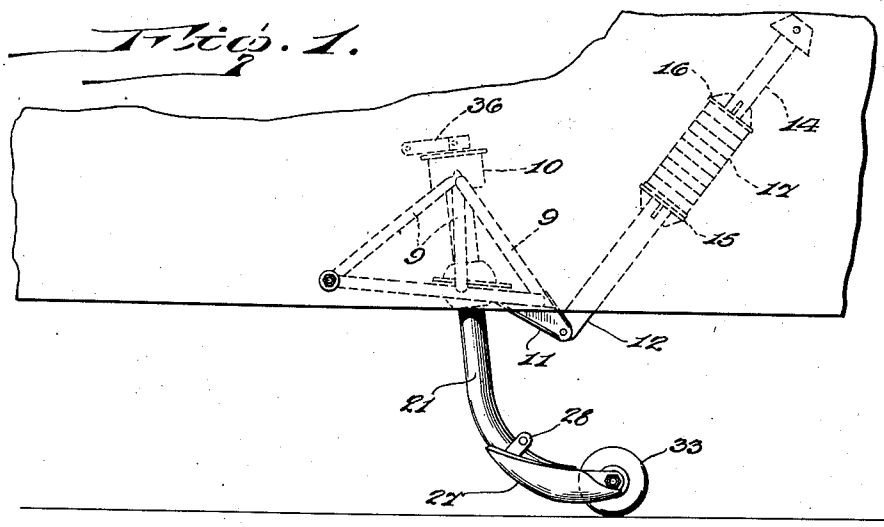
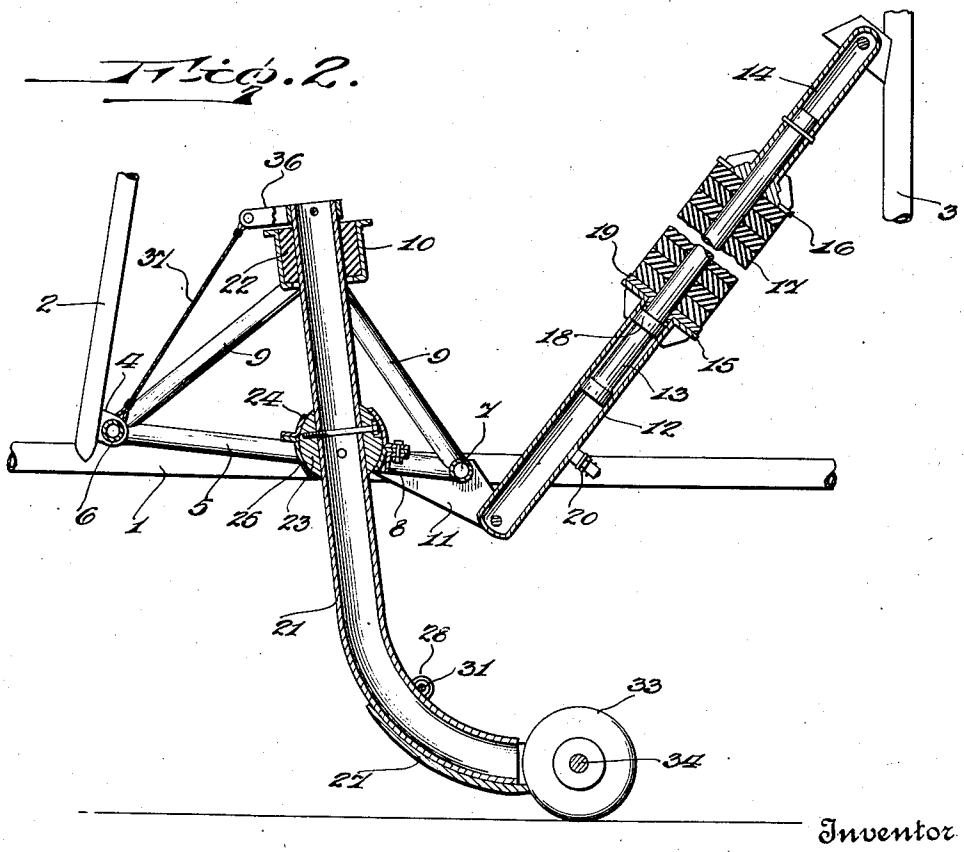


Fig. 2.



Inventor

ROSCOE I. MARKEY

By his Attorney

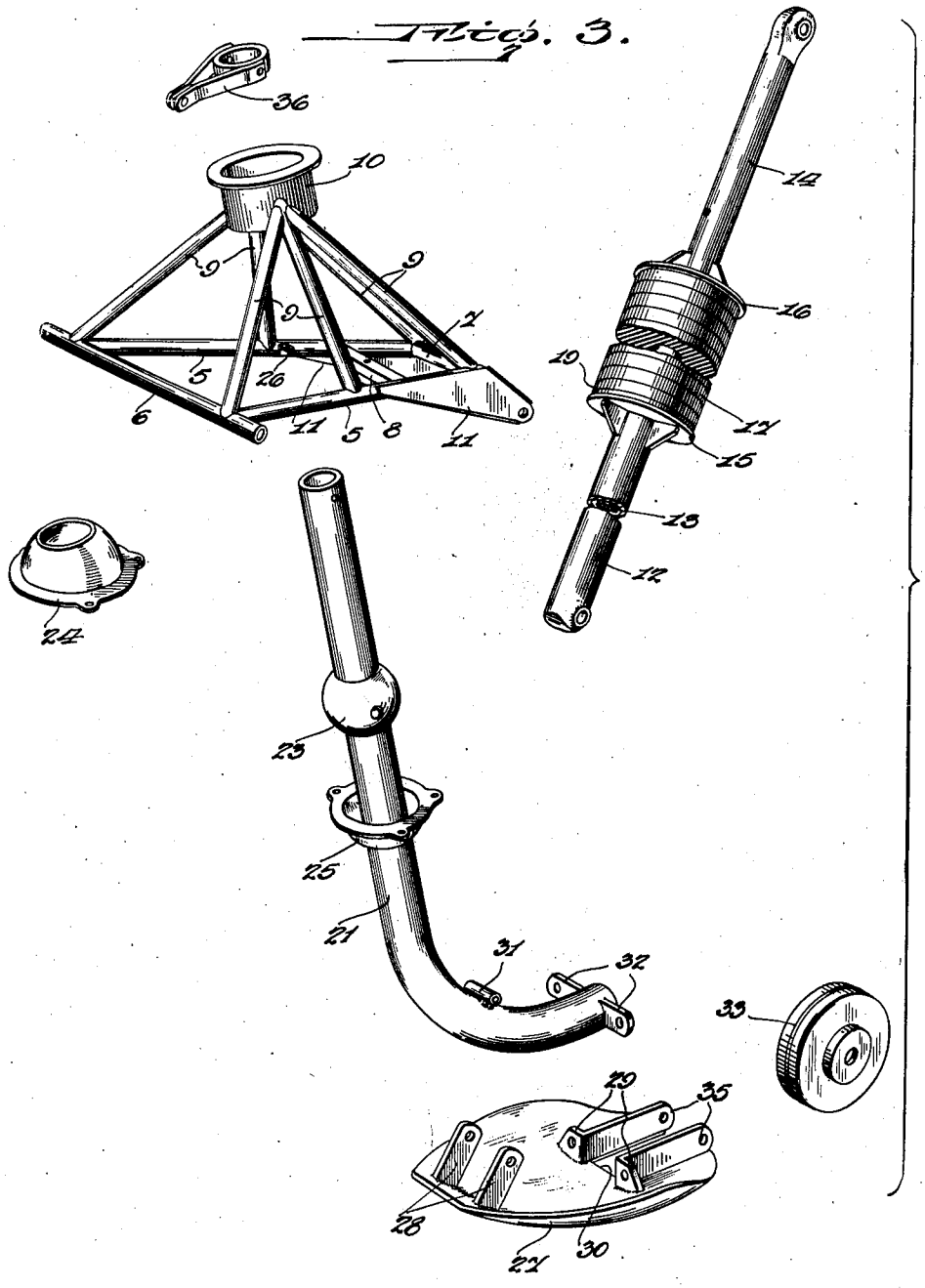
B. H. Carpenter

July 15, 1930. R. I. MARKEY 1,770,756

TAIL SKID

Filed Aug. 30, 1928 2 Sheets-Sheet 2

Fig. 3.



Inventor
ROSCOE I. MARKEY
By his Attorney
B. H. Carpenter

Patented July 15, 1930

1,770,756

UNITED STATES PATENT OFFICE

ROSCOE I. MARKEY, OF BUFFALO, NEW YORK, ASSIGNOR OF ONE-HALF TO FAIRCHILD AVIATION CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE

TAIL SKID

Application filed August 30, 1928. Serial No. 302,911.

This invention relates to aeroplanes in general and particularly to a new and improved landing means.

One object of the present invention is to provide an improved form of tail skid which is equipped with shock absorbers and also with a wheel and a replaceable shoe.

Another object of this invention is to provide a tail skid which is capable of adjusting itself to conform to the direction of motion of the tail of the aeroplane to which it is attached.

It is usual in the construction of land types of aeroplanes to provide a suitable tail skid for the purpose of preventing the tail of the aeroplane from dragging on the ground during landing and taking off operations and thus preventing serious injury of the rudders which are mounted on the tail.

Up to the present time the tail skids in common use have consisted of a simple shoe mounted on the end of a member pivoted or rigidly secured to the tail of the aeroplane and have sometimes been equipped with shock absorbers for the purpose of reducing the damaging effect of landing shocks. Such tail skids have been open to the objection that on hard ground excessive friction between the shoe and the ground caused considerable wear on the shoe while in landing on soft ground the skid shoe would frequently sink in permitting the tail to strike the ground and damage the rudders.

Another objectionable feature of the common types of tail skid is that the friction developed between the shoe and the ground makes it difficult to maneuver a plane on the surface of the ground either under the power supplied by the engine or manually such as in wheeling the aeroplane from its hangar or in bringing it into position ready for a take-off.

It is the principal object of the present invention to provide a new and improved form of tail skid which has none of the disadvantages of the various types of tail skid in present use and which is simple and rugged in construction, is easily attached or removed from the tail of the aeroplane, and has few working parts. Other objects and advantages of the present invention will be apparent from a study of the following specification, claims and appended drawings, in which:

Fig. 1 is a vertical side elevation of a tail skid embodying the present invention.

Fig. 2 is a vertical longitudinal section illustrating the construction and assembly of the parts comprising the tail skid and of the tail skid support.

Fig. 3 is a distended view illustrating in perspective the details of construction of the various parts comprising the tail skid and its support.

The numeral 1 represents one of the lower longitudinal members or longérons of the fuselage frame of which two are provided as a rule and extend lengthwise of the fuselage. The numerals 2 and 3 represent vertically extending bracing members which join the lower longérons 1 of the fuselage to the upper longérons (not shown).

Pivoted between ears 4 formed integral with or suitably secured to the bracing members 2 at each side of the fuselage is a movable frame in which the tail skid proper is mounted. The frame consists of two side members 5 which are joined together by cross-pieces 6, 7, and 8, the cross piece 6 being somewhat longer than the cross-pieces 7 and 8, and is pivotally mounted in the ears 4 so that the entire frame is adapted to swing about the cross-piece 6 as an axis. Upwardly projecting members 9 joined to the side members 5 serve to support a cup-shaped member 10. The side members 5 are not parallel to each other but taper towards each other in a direction opposite to the pivot member 6 and are provided with plates 11 which also taper towards each other so as to form a nose to which is pivoted the lower end of a shock absorber.

The shock absorber, as shown in Figs. 2 and 3, consists of a member 12 composed of a short length of tubing one end of which is pivoted to the nose formed by the plates 11. Adapted to slide smoothly within the cylindrical surface of the member 12 is a plunger 13 which is provided with an enlargement at its end which just fits the inside surface of

the member 12 so as to permit free movement of the plunger 13 without binding. The plunger 13 fits within a member 14 similar in its general construction to the member 12 and is fastened within the member 14 by means of a pin passing through the member 14 and the plunger 13 or by other suitable means. The member 14 is pivoted to a cap welded or otherwise fastened to the vertical bracing member 3, which forms part of the frame of the fuselage. Both of the members 12 and 14 are provided with suitable flanges 15 and 16 which may be welded or screwed in any suitable manner to the members 12 and 14. Interposed between the flanges 15 and 16 are resilient rings 17 which may be composed of rubber or other suitable resilient material or, if so desired, an ordinary coil spring of suitable size may be substituted for the rings 17. For the purpose of preventing the parts just described from becoming displaced from their working positions while the aeroplane is in flight, the plunger 13 is provided with a second enlargement or shoulder 18 which normally abuts against a flange or circular plate 19 which may be screwed or riveted to the flange 15 of member 12. This construction permits the free compression of the rings 17 but prevents the plunger 13 from being withdrawn from the member 12. The lower end of the cylindrical member 12 is closed and a cap opening 20 is provided for the purpose of injecting lubricant by means of a suitable pressure lubricator such as a grease gun. The return of plunger 13 when the load is removed from shock absorbing unit 17 may be cushioned by a resilient washer.

The skid proper consists of a curved member 21 which has the general shape shown in Fig. 3, being constructed of tubing bent in the manner shown, to which is attached a replaceable shoe to be described hereinafter. The upper end of the member 21 projects through the cup-shaped member 10 and is held out of contact with the walls of the cup-shaped member by means of a ring 22 of rubber or other suitable resilient material fitting snugly within the cup-shaped member. As will be noted from a study of Fig. 2 there is considerable clearance provided between the member 21 and the walls of the hole through the bottom of the cup-shaped member 10 in order to permit more or less transverse movement of the member 21 in response to shocks transmitted to the skid when landing the aeroplane on the ground, such movement being resisted by the resilient material comprising the ring 22.

Mounted about midway between the ends of the member 21 is a spherically shaped member 23 which is held in place by means of suitable screws the heads of which are sunk within the member 23 or, if desired by means of suitable pins. Two hemispherical members 24, 25, provided with openings thru which passes the member 21, are clamped together over the spherically shaped member 23 so that the member 23 and the members 24, 25 form a universal joint, an effect which permits the movement of the upper end of the member 21 in all directions subject to the restraining action of the resilient ring 22. The hemispherical member 25 is clamped to lugs 26 carried by the side members 5 and also to the cross piece 8 by means of the same bolts holding the members 24 and 25 together. I do not desire to limit myself in this respect.

Attached to the lower end of the skid 21 is a detachable shoe 27 which is provided with lugs 28 and 29 and also with a cutout portion 30. Welded or otherwise fastened to the lower end of the member 21 on the inside of the curve is a short piece of tubing 31 just long enough to fit between the lugs 28. Also welded or otherwise fastened to the lower end of the member 21 are two lugs 32, the holes of which are adapted to coincide with the similar holes in the lugs 29. Suitable bolts passing through the holes in the lugs 28 and thru the tube 31 and also through the holes in the lugs 29 and 32 serve to clamp the shoe 27 firmly to the lower end of the member 21. The shoe 27 has a broad smooth under surface for the purpose of preventing the end of the member 21 from sinking into soft ground. The cutout portion 30 formed in the shoe 27 is adapted to receive a wheel 33 which is provided with an axle 34 passing through holes 35 in flanges formed integral with or suitably secured to the shoe just adjacent to the cutout portion 30. An arm 36 mounted upon the upper end of the member 21 is connected by means of a resilient cable 37 to the cross piece 6. The cable 37 tends to return the parts when displaced to the position shown in Fig. 2 with the axis of the wheel transverse to the axis of the tail of the aeroplane.

A cavity may be formed within the wheel 33 to serve as an oil reservoir to lubricate the bearing on axle 34. Felt washers held in metallic cups may protect this bearing from grit to prevent wear. The tread of wheel 33 and lower surface of shoe 27 may be specially treated or coated to increase its wearing quality.

The wheel 33 projects below the level of the skid shoe 27 and in landing upon hard ground the wheel 33 supports the tail of the aeroplane entirely or at least to a great extent thus preventing excessive wear on the shoe 27 and at the same time permitting easier handling of the machine. The broad construction of the surface of the shoe permits landing on soft ground without sinking into the mud with the damage that usually results when the ordinary type of skids are used. The shock absorber mechanism comprised by the members 12 and 14

and their associated parts takes up the greater portion of the shock transmitted to the member 21 in landing while the remainder is absorbed by the resilient material in the ring 22 within the cup-shaped member 10. In executing a sharp turn the member 21 will be turned within the joint formed by the members 24 and 25 so as to permit the tail to move over such slight obstructions as ruts or stones present on the landing field while the resilient cable 37 will tend to restore the member 21 to its proper position with the axis of the wheel transverse to the axis of the tail of the aeroplane after the turn is completed. A very distinct advantage of the present inventiaon is that it greatly reduces the effort required to wheel an aeroplane to which it is attached into position on the landing field or into and out of the hangar and permits exceptionally easy handling of the machine under its own power as well as by hand upon the landing field.

Various changes in the construction of the embodiment illustrated in the drawings may be made without departing from the spirit of the invention, and I do not desire to limit myself to the specific construction shown and described, but to interpret the invention broadly within the scope of the appended claims.

What I claim as my invention is:

1. In a tail skid for aeroplanes, the combination of a pivoted tail skid support, a tail skid pivotally mounted in said support by means of a universal mounting, a shock absorbing means for said tail skid support, and independent shock absorbing means for said tail skid.

2. In a tail skid for aeroplanes, the combination of a tail skid support, a tail skid pivotally mounted in said support by means of a universal mounting, a shock absorbing means for said tail skid support, and independent shock absorbing means for said tail skid, a detachable shoe for said tail skid adapted to prevent said tail skid from sinking into soft ground, and a wheel mounted on said shoe for permitting the tail skid to move over hard ground.

3. In a tail skid for aeroplanes, the combination of a flexibly mounted skid member, shock absorbing means for said skid member, a pivoted supporting means for said skid member, and shock absorbing means for said supporting means, said shock absorbing means being independent in their actions.

4. In a tail skid for aeroplanes, the combinaton of a skid member, supporting means for said skid member, shock absorbing means for said skid member, a pivoted supporting means for said skid member, and shock absorbing means for said supporting means, said shock absorbing means being independent in their actions, a detachable shoe for said skid member, a wheel mounted on said shoe, and separate shock absorbing means for said skid member and said supporting means.

5. In a tail skid for aeroplanes, the combination of a pivoted tail skid support, a tail skid pivotally mounted in said support by means of a universal mounting, and means for restoring said skid member to its normal position after it has been displaced in landing and taking-off operations.

In testimony whereof I affix my signature.

ROSCOE I. MARKEY.