

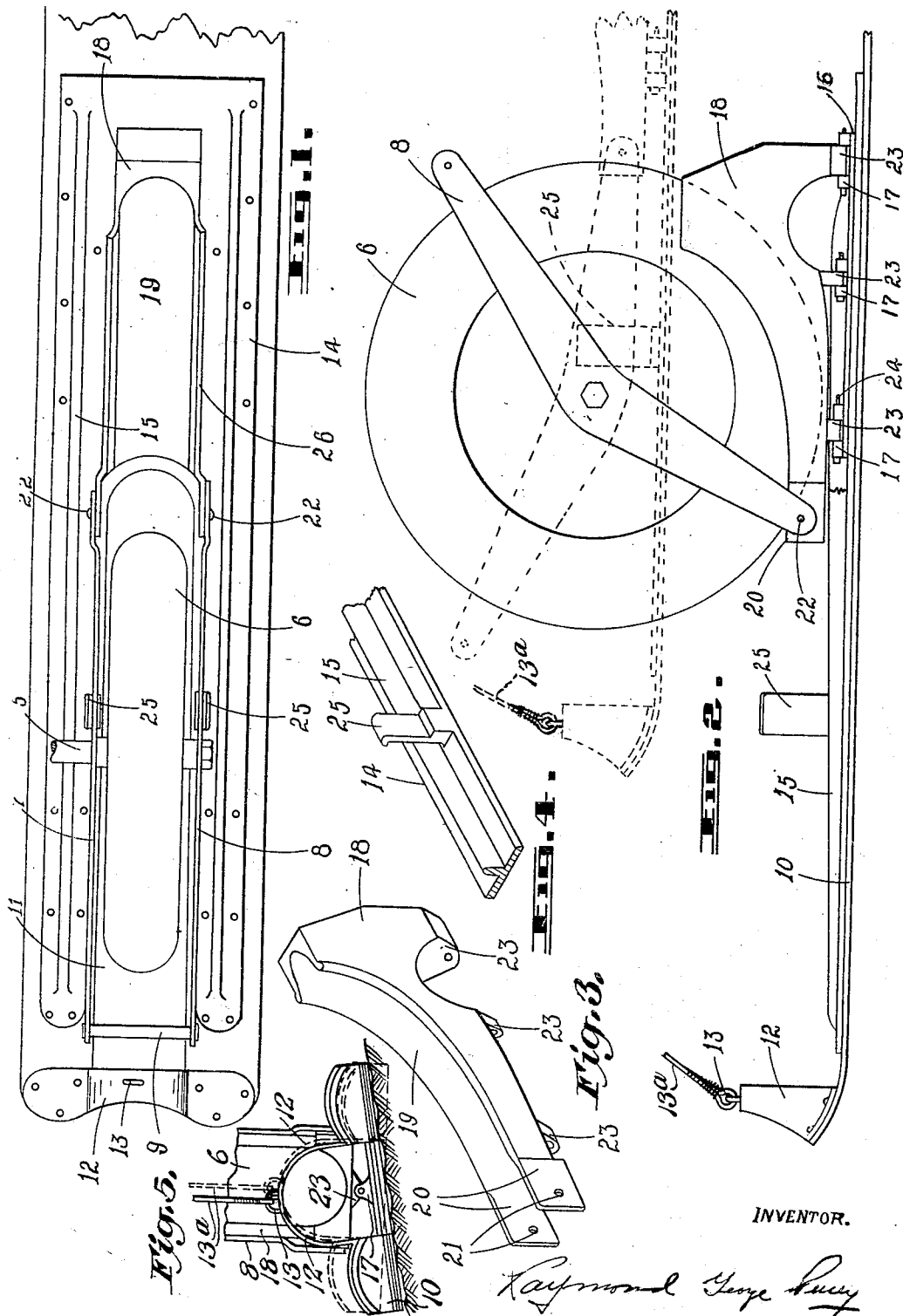
Feb. 9, 1932.

R. G. PERRY

1,844,295

LANDING GEAR FOR AIRCRAFT

Original Filed Nov. 4, 1929



INVENTOR.

Raymond George Perry

UNITED STATES PATENT OFFICE

RAYMOND GEORGE PERRY, OF OTTAWA, ONTARIO, CANADA

LANDING GEAR FOR AIRCRAFT

Application filed November 4, 1929, Serial No. 404,736, and in Canada October 24, 1929. Renewed December 22, 1930.

This invention relates to an auxiliary landing gear for aircraft and more particularly to a means whereby aircraft equipped with ground landing gear may carry therewith auxiliary ski landing gear whereby the aircraft may be landed either on wheels or if desired may effect a ski landing where the nature of the landing field calls for the same.

With these and other objects in view as will appear as the description proceeds, the invention consists of the novel construction, combination and arrangement of co-operating elements as hereinafter more specifically set forth, claimed and shown in the accompanying drawings forming part of the present application, in which:

Fig. 1 is a top plan view of an aircraft landing wheel with my auxiliary landing gear attached in combination therewith.

Fig. 2 is a side elevation of the various component parts disclosed in Figure 1, the auxiliary ski attachment shown in lowered or operative position, while the raised position of the ski is shown in dotted lines.

Fig. 3 is a perspective view of the tire-seat casting forming a component part of my invention.

Fig. 4 is a perspective view of a section of one of the ski re-enforcing members.

Fig. 5 is a rear view of the rear portion of one of the skis of my invention.

Like numerals of reference designate corresponding parts throughout the different views.

5 represents one end of an axle which may be the ordinary rigid or split axle type of undercarriage construction.

6 is the ordinary landing wheel suitably supported on the axle 5.

7 and 8 are lever rocker-arms rockably mounted on the axle on each side of the wheel 6. These lever rocker-arms may be connected together at their upper end by means of a bolt or bar 9.

10 is a ski which may be of any desired conventional construction. Formed in the ski 10 is an elongated slot as at 11. This slot 11 is slightly wider at the rear end, the purpose of which will hereinafter be referred to.

12 is a bridging bracket which serves to retain the opposite rear portions of the ski in rigid relative position.

13 is an eyelet secured to the bridging bracket 12 to which a shock cord may be attached. The elasticity of the shock cords 13a will permit the skis to pivot both laterally and longitudinally relative to the axle 5, while in ground contact. When the aircraft is in flight, the shock cords 13a will tensionally restrain the skis against longitudinal pivotal motion and through its connection with the raised portion of the bridge 12, will tensionally restrain the skis against lateral pivotal motion.

Secured to the upper face of the ski 10 is a base member 14 which is bifurcated to straddle the elongated slot 11 in the ski.

15 are reinforcing ribs preferably integral with the base member 14, which ribs are slightly higher adjacent the forward end thereof.

16 is a raised portion of the base 14.

17 are bearing blocks preferably integral with the raised portion 16. These blocks are in alignment and centrally bored.

18 is a casting having formed in the upper portion thereof an arcual rounded groove seat 19.

20 are leaf plates extending rearwardly from each side of the casting 18, which plates are provided with oppositely registering openings 21. The lower ends of the lever rocker-arms 7 are also provided with oppositely registering openings adapted to register with the openings 21 in the leaf plates 20. Rivets 22 or other means may be used to provide pivotal connection between the lower ends of the lever rocker-arms 7 and the leaf plates 20.

Extending downwardly from the casting 18 are centrally aligned bearing blocks 23 spaced for engagement between the respective bearing blocks 17. These bearing blocks 23 are centrally bored similar to the bearing blocks 17 and are held in pivotal relationship therewith by means of the bolts 24, which extend through the central bores in the respective blocks 17 and 23. Suitable lubrication means

may be provided for lubricating these pivotal connections.

25 are upwardly projecting supporting blocks, the purpose of which will hereinafter be disclosed.

The various component parts of the assemblage just hereinbefore described will be duplicated on each end of the undercarriage axle.

I have not shown any particular means for manually or otherwise operating the lever rocker-arms 7, as various methods or forms of construction may be used for adaptation to various types of aircraft.

When the operator is taking off or landing on the ground wheels the skis will be in raised position as shown in dotted lines, Fig. 2. To prevent lateral pivotal movement of the skis while in raised position and to retain the skis in fixed alignment with the respective wheels, the lower portion of the lever rocker-arms snugly fit between the supporting blocks 25.

Another advantageous feature of these blocks 25 is that, if when making a wheel landing one of the wheels drops or sinks into a soft spot on the landing field, the ski will contact over a large area of ground and owing to the lever rocker-arms contacting with the blocks 25 the weight of the aircraft will be taken up thereby and transmitted to the ski. This taking up of the weight of the aircraft will prevent the undercarriage from sinking further and will minimize the danger of the aircraft "nosing over."

If the operator desires to take off or make a landing on snow or ice he will operate the lever rocker-arms from the position shown in dotted lines to that shown in full lines Fig. 2. This operation will cause the skis and castings 18 to be swung downwardly and rearwardly until the tires of the wheels 6 snugly fit into the arcual grooves 19. It will be noted that the pivotal connection between the lever rocker-arms and the castings 18 will then be rearwardly of the axle 5. This relation between the castings 18 and the axle 5, will, owing to the weight of the aircraft retain the tires of the wheels 6 snugly in the arcual grooves 19. The curved edges 26 of the castings 18 may be flared outwardly to insure proper entry of the tires into the arcual grooves 19.

If during operation of the aircraft, snow or other foreign matter should lodge between the wheels of the skis, the tapered formation of the elongated slot 11 will allow ready removal of the skis from the wheels when the operator desires to make a ski landing or a ski take off.

I am aware of the fact that various auxiliary ski landing equipment has been brought forward from time to time and after a careful study of these various constructions and knowing the objectionable features of the

same, I have conceived the present invention which is designed to overcome many difficulties wherein other auxiliary ski landing equipment has been found inadequate. One objectionable feature which has been strongly emphasized was that no lateral pivotal movement of the skis relative to the wheel landing undercarriage was provided. This pivotal movement is essential to ski landings and take-offs so that the weight of the aircraft will bear centrally under the ski and be distributed equally thereof irrespective of the undulating nature of the landing field. To overcome this undesirable feature I conceived the idea of the pivotal connection between the castings 18 and the skis 10, and after extensive experimenting have found that this provides for the situation as just outlined. The present construction also provided an auxiliary landing gear which may be operated with a minimum of effort and in which, during operation, the skis remain in constant alignment with the wheel landing gear.

The foregoing specification and annexed drawings disclose the preferred embodiment of my invention, but it is to be understood that minor changes may be resorted to in the commercial adaptation of my invention without departing from the scope of the invention as hereinafter claimed.

What I claim as new is:

1. An auxiliary ski landing device for aircraft comprising in combination with a wheel landing undercarriage, a pair of lever arms rockably mounted on each end of the axle of said undercarriage on opposite sides of each of the wheels of said undercarriage; a casting connected at one end to the lower extremities of each of said pairs of lever arms; longitudinally aligned bearing blocks on the under face of each of said castings; a pair of skis; a longitudinal tapered slot formed in the rear portion of each of said skis, one of said wheels adapted to normally extend through each of said slots respectively; longitudinally aligned bearing blocks on the forward portion of each of said skis adapted for lateral hinging connection with said first mentioned bearing blocks; a hollow arcual seat formed in the upper portion of each of said castings and a means for actuating said lever arms to lower said skis so that the curvature of the tires of said wheels will be firmly seated in said seats.

2. An auxiliary ski landing device for aircraft comprising in combination with a wheel landing undercarriage, a pair of lever arms rockably mounted on each end of the axle of said undercarriage on opposite sides of each of the wheels of said undercarriage; a casting connected at one end to the lower extremities of each of said pairs of lever arms; longitudinally aligned bearing blocks on the under face of each of said castings; a pair of

skis; a longitudinal tapered slot formed in the rear portion of each of said skis, one of said wheels adapted to normally extend through each of said slots respectively; longitudinally aligned bearing blocks on the forward portion of each of said skis adapted for lateral hinging connection with said first mentioned bearing blocks; a hollow arcual seat formed in the upper portion of each of said castings; a means for actuating said lever arms to lower said skis so that the curvature of the tires of said wheels will be firmly seated in said seats and a means for retaining said skis in fixed alignment with said wheels.

3. A landing gear for an aircraft comprising a pair of skis, each mounted in alternative lateral pivotal relationship to said aircraft and a means for tensionally restraining against lateral pivotal motion of said skis.

4. A landing gear for an aircraft comprising a pair of skis, each mounted in independent alternative lateral and longitudinal pivotal relationship to said aircraft and means for tensionally restraining against the pivotal motions of said skis.

5. A landing gear for an aircraft embodying primary landing wheels; a pair of skis, mounted in alternative lateral pivotal relationship to said aircraft when said skis are in operative position and a means whereby said wheels and said skis may be moved to raised or lowered position relative to each other.

6. A landing gear for an aircraft embodying primary landing wheels; a pair of skis, mounted in alternative lateral pivotal relationship to said aircraft when said skis are in operative position; means for tensionally restraining against lateral pivotal motion of said skis when in such position and a means whereby said wheels and said skis may be moved to raised or lowered position relative to each other.

7. A landing gear for an aircraft embodying primary landing wheels; a pair of skis, mounted in alternative lateral and longitudinal pivotal relationship to said aircraft when said skis are in operative position and a means whereby said wheels and said skis may be moved to raised or lowered position relative to each other.

8. A landing gear for an aircraft embodying primary landing wheels; a pair of skis, mounted in alternative lateral and longitudinal pivotal relationship to said aircraft when said skis are in operative position; means for tensionally restraining against lateral pivotal motion of said skis when in such position and a means whereby said wheels and said skis may be moved to raised or lowered position relative to each other.

9. A landing gear for an aircraft embodying primary landing wheels; a pair of skis,

mounted in alternative lateral pivotal relationship to said aircraft when said skis are in operative position; a means whereby said wheels and said skis may be moved to raised or lowered position relative to each other and means to prevent lateral pivotal motion of said skis when in raised position.

10. A landing gear for an aircraft embodying primary landing wheels; a pair of skis; means whereby said skis may be lowered from raised position to ground contact position and said wheels moved from ground contact to raised position onto said skis; said means adapted to return said wheels to ground contact and return said skis to raised position and a mounting between said skis and said wheels whereby said skis may move in lateral pivotal relationship to said wheels when said skis are in ground contact position.

11. A landing gear for an aircraft embodying primary landing wheels; a pair of skis; means whereby said skis may be lowered from raised position to ground contact position and said wheels moved from ground contact to raised position onto said skis; said means adapted to return said wheels to ground contact and return said skis to raised position; a mounting between said skis and said wheels whereby said skis may move in lateral pivotal relationship to said wheels when said skis are in ground contact position and means to prevent such lateral pivotal motion of said skis when said skis are in raised position.

12. A landing gear for an aircraft embodying primary landing wheels; a pair of skis; means whereby said skis may be lowered from raised position to ground contact position and said wheels moved from ground contact to raised position onto said skis; said means adapted to return said wheels to ground contact and return said skis to raised position; a mounting between said skis and said wheels whereby said skis may move in lateral and longitudinal pivotal relationship to said wheels when said skis are in ground contact position and means to prevent such lateral pivotal motion of said skis when said skis are in raised position.

13. A landing gear for an aircraft embodying primary landing wheels; a pair of wheel-supporting seats; a pair of skis carried by and in alternative lateral pivotal relationship to said seats and a means whereby said wheels and said skis may be moved to raised or lowered position relative to each other.

14. A landing gear for an aircraft embodying primary landing wheels and a pair of skis mounted in lateral and longitudinal pivotal relationship to said aircraft and means whereby said skis may be raised and lowered relative to said wheels.

15. A landing gear for an aircraft embodying primary landing wheels; a pair of skis, mounted in lateral and longitudinal pivotal

and vertical relationship to said aircraft and means for tensionally restraining against the pivotal motions of said skis.

16. A landing gear for an aircraft embody-
 ing primary landing wheels; a pair of skis;
 means whereby said skis may be lowered from
 raised position to ground contact position and
 said wheels moved from ground contact to
 raised position onto said skis; said means
 adapted to return said wheels to ground con-
 tact and return said skis to raised position; a
 mounting between said skis and said wheels
 whereby said skis may move in lateral pivotal
 relationship to said wheels when said skis are
 in ground contact position and means for ten-
 sionally restraining against the lateral pivotal
 motion of said skis.

17. A landing gear for an aircraft embody-
 ing primary landing wheels; a pair of skis;
 means whereby said skis may be lowered from
 raised position to ground contact position and
 said wheels moved from ground contact to
 raised position onto said skis; said means
 adapted to return said wheels to ground con-
 tact and return said skis to raised position; a
 mounting between said skis and said wheels
 whereby said skis may move in lateral pivotal
 relationship to said wheels when said skis are
 in ground contact position; means to prevent
 such lateral pivotal motion of said skis when
 said skis are in raised position and means for
 tensionally restraining against the lateral
 pivotal motion of said skis.

18. A landing gear for an aircraft em-
 bodying primary landing wheels; a pair of
 skis; means whereby said skis may be lowered
 from raised position to ground contact posi-
 tion and said wheels moved from ground con-
 tact to raised position onto said skis; said
 means adapted to return said wheels to
 ground contact and return said skis to raised
 position; a mounting between said skis and
 said wheels whereby said skis may move in
 lateral and longitudinal pivotal relationship
 to said wheels when said skis are in ground
 contact position; means to prevent such lat-
 eral pivotal motion of said skis when said skis
 are in raised position and means for tension-
 ally restraining against the longitudinal piv-
 otal motion of said skis.

19. A landing gear for an aircraft embody-
 ing primary landing wheels; a pair of wheel-
 supporting seats; a pair of skis carried by
 and in alternative lateral pivotal relationship
 to said seats; a means whereby said wheels
 and said skis may be moved to raised or low-
 ered position relative to each other and means
 for tensionally restraining against the lateral
 pivotal motion of said skis.

20. A landing gear for an aircraft em-
 bodying primary landing wheels; a pair of
 skis, mounted in lateral and longitudinal
 pivotal and vertical relationship to said air-
 craft and means for tensionally restraining
 against the lateral pivotal motion of said skis.

21. A landing gear for an aircraft embody-
 ing primary landing wheels; a pair of skis,
 mounted in lateral and longitudinal pivotal
 and vertical relationship to said aircraft and
 means for tensionally restraining against the
 lateral and longitudinal pivotal motion of
 said skis.

22. A landing gear for an aircraft embody-
 ing primary landing wheels; a pair of skis,
 mounted in lateral and longitudinal relation-
 ship to said aircraft; means for raising and
 lowering said skis relative to said wheels and
 means whereby the weight of said aircraft
 will be supported on said skis, while said
 wheels are in ground contact position and
 when said wheels sink in a soft landing area.

In testimony whereof, I affix my signature.

RAYMOND GEORGE PERRY.

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