(No Model.) 2 Sheets—Sheet 1.

T. A. STARK.

MOTOR.

No. 490,173. Patented Jan. 17, 1893.

Fig. 1

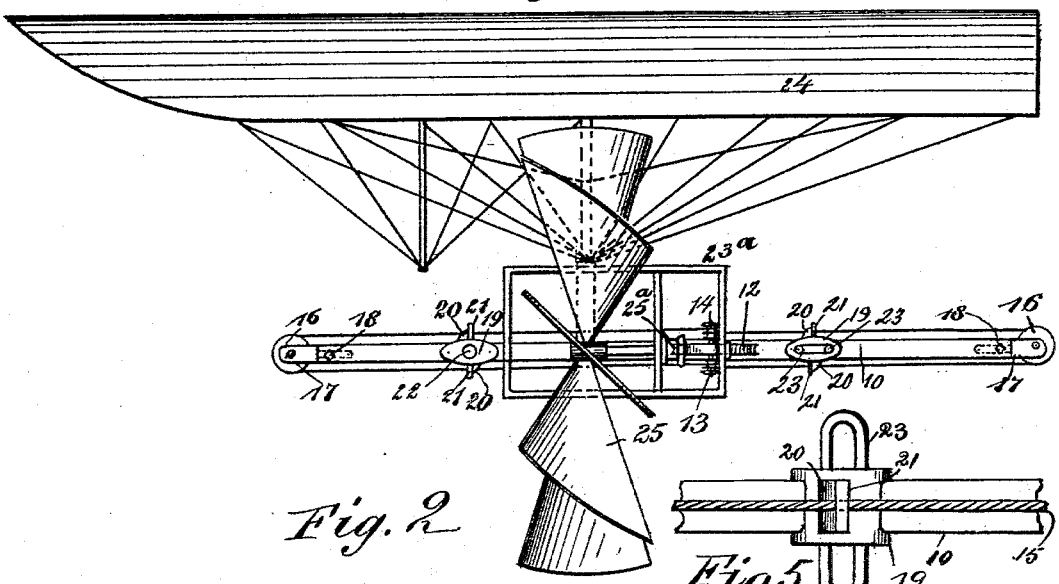


Fig. 2

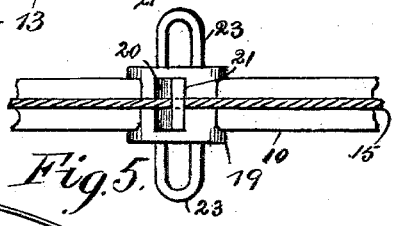


Fig. 5.

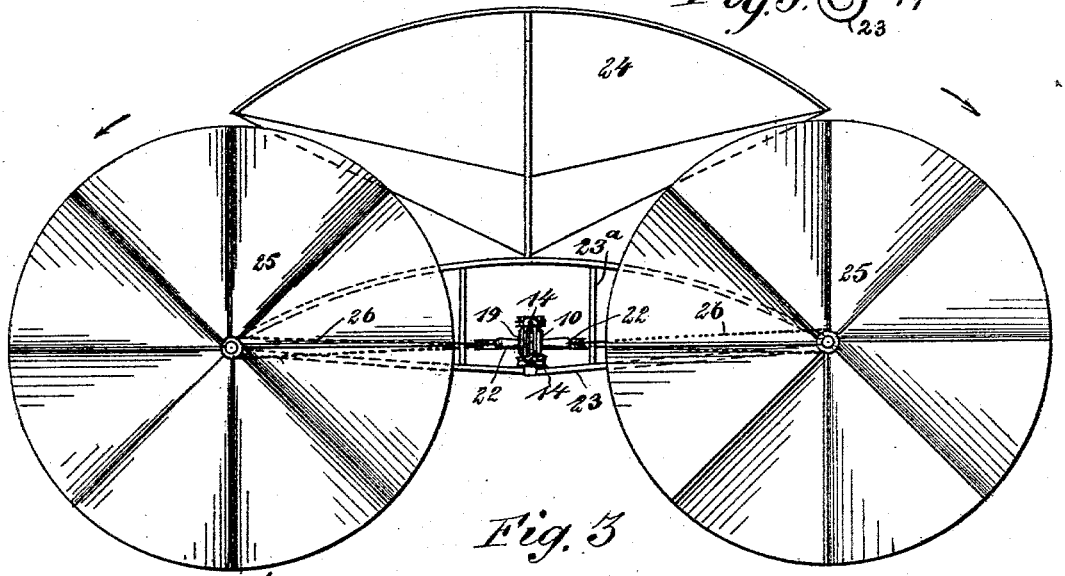


Fig. 3

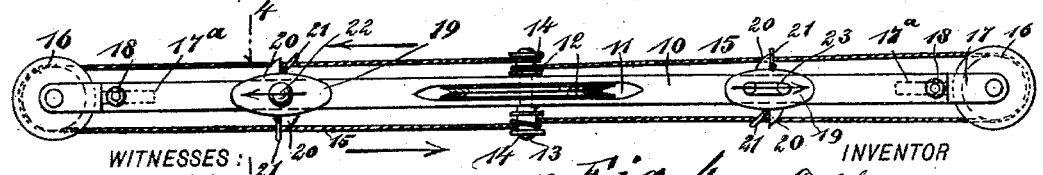
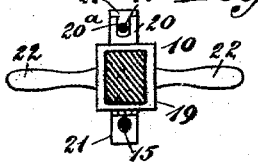


Fig. 4



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(No Model.) 2 Sheets—Sheet 2.

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MOTOR.

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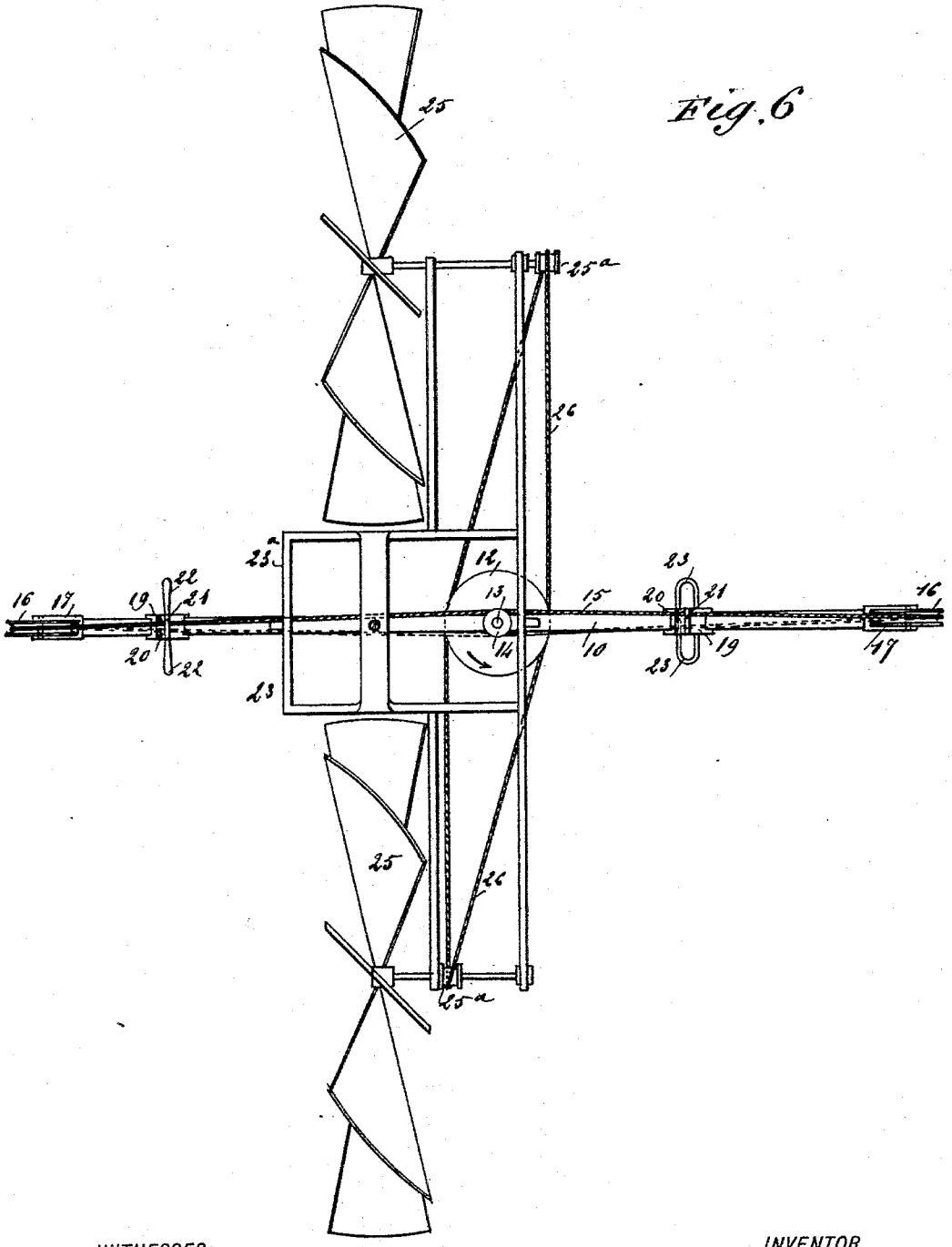
Fig. 6



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THEODORE A. STARK, OF OTTAWA, ILLINOIS.

MOTOR.

SPECIFICATION forming part of Letters Patent No. 490,173, dated January 17, 1893.

Application filed June 6, 1892. Serial No. 435,729. (No model.)

To all whom it may concern:

Be it known that I, THEODORE A. STARK, of Ottawa, in the county of La Salle and State of Illinois, have invented a new and Improved Motor, of which the following is a full, clear, and exact description.

My invention relates to improvements in motors, and the object of my invention is to produce an extremely simple motor, which is adapted to be operated by the hands and feet of a person, which is provided with reciprocating slides actuated by the hands or feet, and having means for converting their reciprocating strokes into continuous rotary motion, which is very light, strong and durable, which is adapted for use as an exercising machine, as it brings all the muscles of the body into play, and which may be made useful for driving flying machines, bicycles, boats, and other things which do not require a great amount of power.

To this end, my invention consists in a motor, the construction of which will be hereinafter described and claimed.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar figures of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the motor embodying my invention, showing it as applied to a flying machine; Fig. 2 is an end view of the same; Fig. 3 is an enlarged detail side elevation of the motor proper; Fig. 4 is a cross section on the line 4—4 in Fig. 3. Fig. 5 is a broken enlarged plan of the main bar, the driving cable, and one of the slides which operates the cable, and Fig. 6 is a plan view of the machine with the aeroplane removed.

The frame of the motor consists of a straight bar 10, which is preferably hollow to give it the necessary lightness, and this bar has centrally therein an opening 11, extending sidewise through it, and in this opening or slot is a driving pulley 12, which is preferably grooved, and is secured to a driving shaft 13, which is journaled in the bar 10 and extends above and below the same, the shaft having on its ends flanged pulleys 14, which are driven by an endless belt 15, this being wound once or twice around the pulleys to prevent it from slipping. The belt is also held to run over anti-friction or guide pulleys 16, which are also grooved and which are held at the ends of the bar 10, the pulleys being journaled in forks 17 having shanks 17^a, which extend into the ends of the bar, and the forks are held in position by set screws 18, which are held to turn in the bar and impinge upon the fork shanks. By this means the forks and pulleys may be adjusted so as to give the proper tension to the belt.

On the bar 10 near the ends, are slides 19, which move easily on the bar, one being adapted to be operated by the hands and the other by the feet of a person, and each slide is provided on its upper and lower sides with projecting abutments 20, which have square shoulders at right angles to the belt 15, and the abutments are oppositely arranged,—that is, the shoulder of one faces in one direction and the shoulder of the other in the opposite direction. The abutments are grooved, as shown at 20^a, so that the belt 15 may be held within the groove, and each slide has adjacent to the shoulder of the abutment a swinging leaf or link 21, through which the belt 15 extends. It will thus be seen that when the slide is pulled in one direction, the leaf on one side will swing up against the abutment, and the slide will move freely along the belt and rod without actuating the belt, but when moved in the other direction, the leaf or link will bind the belt between the leaf and the abutment, and consequently the movement of the slide will be imparted to the belt.

One slide has laterally-extending handles 22, which are adapted to be clasped by the hands of the operator, and the other slide has pedals 23, in which the feet of the operator may be inserted, and the feet may be secured to the pedals by means of any suitable straps.

In Figs. 1 and 2, I have shown the application of the motor to a flying machine, but it will be understood that it may be used for other purposes. As here shown, the motor is suspended in a light open frame 23^a, which extends transversely to the bar 10, and is tapered at the ends, this frame having an open central space large enough to receive the body of the operator, and the frame is suspended from an aeroplane 24, which may or may not be inflated, as desired. At the ends of the frame 23^a are revoluble propelling wheels 25, these being formed of a series of radially-ex-

tending blades, and the hubs of the propellers are provided with grooved pulleys 25ª, which connect by means of a belt 26 with the driving pulley 12, so that the movements of the pulley may be transmitted to the propellers and the flying machine operated. The blades of the propellers are arranged at such an angle that they will lift upward on the machine and at the same time move it forward. The motor may however, be attached to any kind of a flying machine.

It is operated as follows: The operator places himself within the frame 23ª and above the bar 10, his body being extended in a nearly parallel position to the bar, and his body is suspended by means of a suitable belt attachment around his waist, any suitable harness being employed for this purpose. He then grasps the handles 22 of one slide with his hands, has his feet secured to the slide on the other side of the driving pulley 12, and performs much the same movements as in swimming,—that is to say, the slides are first pulled toward each other by the drawing up of the hands and feet, and they are then pushed in the opposite direction by the reverse movement. The arrangement of the slides and leaves 21, with their oppositely arranged abutments is such that when the slides are pulled toward the center of the bar, the upper leaf 21 on the foot slide will pull forward on the belt 15, moving it in the direction indicated by the arrows, and the lower leaf 21 of the hand slide will pull in the opposite direction on the lower strand of the belt, thus moving the whole body of the belt in the same direction, and when the slides are pushed apart, the reverse action takes place so as to keep the belt moving in the same direction,—that is to say, the lower leaf 21 of the foot slide will pull upon the lower strand of the belt, and the upper leaf of the hand slide will pull upon the upper strand of the belt, as shown clearly in Fig. 3.

In constructing the motor,—it should be made of as light material as possible, and the movable parts should all be provided with some form of ball bearings so that they may move with as little friction as possible.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent:—

1. A motor, comprising a bar or frame having pulleys at the ends, a driving belt held to run upon the pulleys and reciprocating slides mounted on the bar, each slide having on opposite sides abutments through which the belt passes, and hinged leaves or grippers adapted to frictionally engage the belt and close against the abutments, substantially as described.

2. A motor, comprising a bar or frame having pulleys at its ends and a driving pulley in the center, an endless belt held to run over the end pulleys and to drive the center pulley, and movable slides mounted on the bar on opposite sides of the driving pulley, the slides having friction devices to engage the belt, substantially as described.

3. A motor, comprising a bar or frame having a driving pulley arranged centrally therein and flanged pulleys secured to opposite ends of the driving pulley shaft, anti-friction pulleys journaled at the ends of the machine, an endless belt held to run over the anti-friction pulleys and arranged to drive the flanged pulleys, and slides mounted on the opposite end portions of the bar or frame, the slides having friction devices adapted to engage the belt, substantially as described.

4. A motor, comprising a bar or frame having anti-friction pulleys at its ends, a central driving pulley, an endless belt held to run over the antifriction pulleys and to drive the driving pulley, and slides held to move on opposite end portions of the bar or frame, the slides having friction devices to engage the belt, these being arranged so that the two slides shall simultaneously engage opposite strands of the belt, substantially as described.

5. In a motor, the combination of the bar having pulleys at its ends, and a driving pulley at the center, a belt held to move over the end pulleys and to drive the center pulley, slides held to move on opposite end portions of the bar, grooved abutments extending from the slides and adapted to receive the belt, and swinging leaves secured to the slides and having perforations to receive the belt, the leaves being held to swing against the abutments, substantially as described.

6. The combination of the main bar having pulleys at its ends, a driving pulley journaled near the center of the bar, an endless belt held to run over the end pulleys and to drive the driving pulley, movable slides mounted on the bar on opposite sides of the driving pulley, the slides having friction devices to engage the belt, handles secured to one of the slides, and pedals secured to the opposite slide, substantially as described.

THEODORE A. STARK.

Witnesses:
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MOSES STIEFEL.