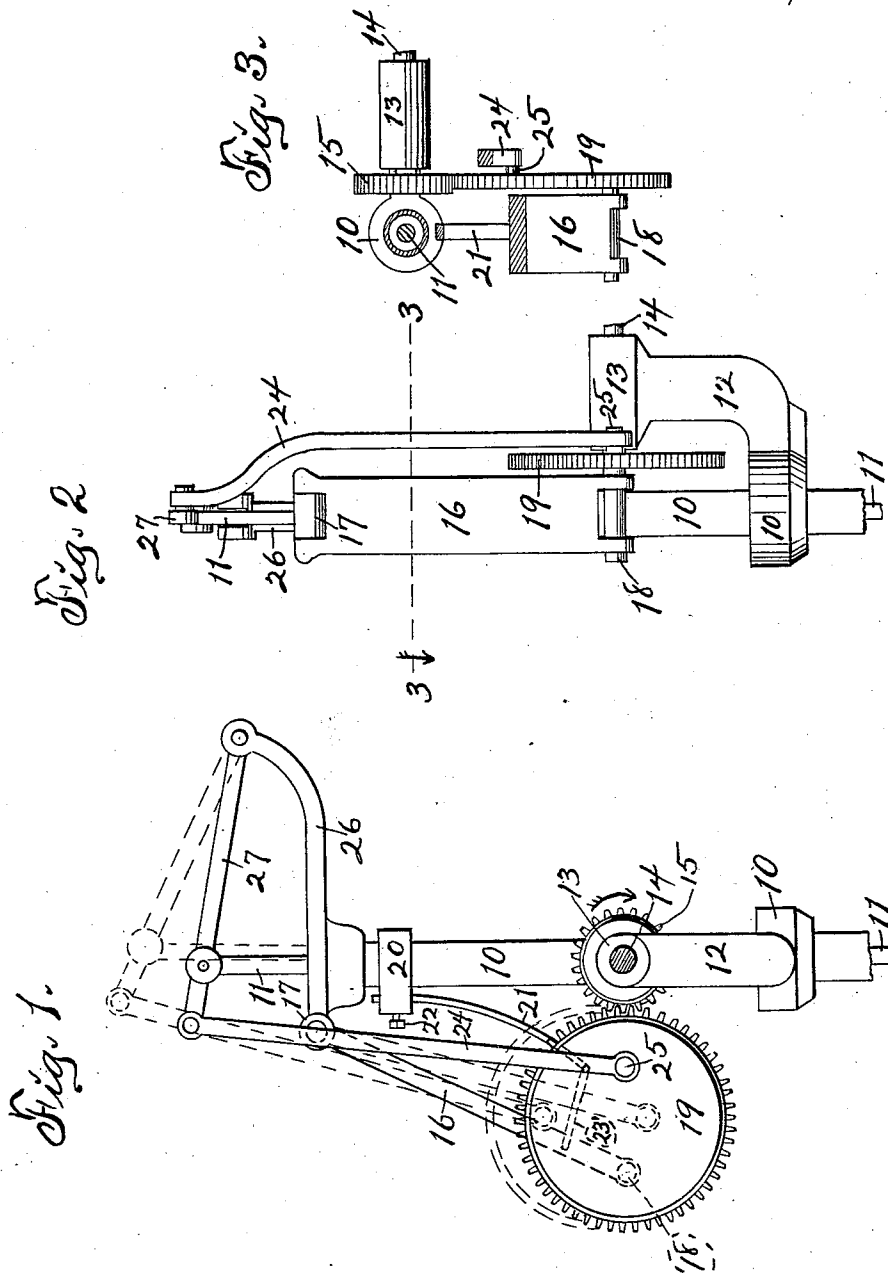


C. J. ZIRBEL.
AIR MOTOR GEAR.
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1,015,921.

Patented Jan. 30, 1912.



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UNITED STATES PATENT OFFICE.

CARL J. ZIRBEL, OF MONTEZUMA, IOWA.

AIR-MOTOR GEAR.

1,015,921.

Specification of Letters Patent.

Patented Jan. 30, 1912.

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To all whom it may concern:

Be it known that I, CARL J. ZIRBEL, citizen of the United States of America, and resident of Montezuma, Poweshiek county, Iowa, have invented a new and useful Air-Motor Gear, of which the following is a specification.

The object of this invention is to provide an improved construction for air-motor gears in which the leverage of the air-motor on the load is variable, being the greatest at the point of the application of the greatest load.

My invention consists in the construction, arrangement and combination of elements hereinafter set forth, pointed out in my claims and illustrated by the accompanying drawing, in which—

Figure 1 is an elevation, partly in section, illustrating my improved gearing in position for practical operation on a windmill head, dotted lines indicating altered positions of some of the parts. Fig. 2 is an elevation at right angles to Fig. 1. Fig. 3 is a horizontal section on the line 3—3 of Fig. 2.

In the construction of the mechanism as shown the numeral 10 designates a machine head which is mounted for rotation on a vertical axis in any suitable manner on the top of an air-motor tower (not shown). The general shape of the head 10 is that of an upright tube or cylinder open at both ends. A pump rod 11 is mounted at its upper end within and adapted for vertical reciprocation through the head 10, and extends downwardly therefrom to a point of application of the load, such as a pump (not shown). The pump rod 11 fits quite loosely within the tubular head 10 so as to permit a freedom of lateral movement of the upper end of said rod. The pump rod 11 is formed with a universal coupling (not shown) near its upper end in order that the upper end portion thereof may rotate on a vertical axis with the tubular head 10 independently of the lower portion thereof. A bracket 12 is formed on the lower portion of the machine head 10 and extends laterally to one side thereof, and the outer end of said bracket is turned up to a position parallel with and spaced from the tubular body of said head. The bracket 12 is formed with an elongated horizontal bearing 13 at its upper end and an air-motor shaft 14 is journaled for rotation in said

bearing. The outer end portion of the shaft 14 carries a wind wheel (not shown) of any suitable construction. A spur gear 15 is fixed to and for rotation with the shaft 14 at its inner end and occupies a position between the head 10 and bracket 12. A swinging arm 16 is forked and pivotally connected at its upper end to a laterally projecting ear 17 on the upper end portion of the machine head 10. A shaft 18 is journaled for rotation in the lower end portion of the swinging arm 16, said lower end portion preferably being forked to provide two bearing points for said shaft. The shaft 18 projects at one end beyond the arm 16 and a spur gear 19 is fixed to the outer end thereof and meshes with the gear 15 on the air-motor shaft. The gear 19 is mounted eccentrically on the shaft 18 and preferably is of considerably greater diameter than the gear 15. A collar 20 is fixed to the upper portion of the tubular head 10 and the upper end portion of a leaf spring 21 is detachably secured in said collar by means of a set screw 22. The spring 21 extends downwardly from its point of attachment and is pivotally connected at its lower end to one end of a link 23, the opposite end of said link being pivotally connected to the lower portion of the swinging arm 16. It is the function of the spring 21 to tend to hold the lower portion of the arm 16 inwardly toward the head 10 and keep the gear 19 in mesh with the driving gear 15. A pitman 24 is pivotally connected at its lower end by means of a wrist pin 25 to the outer face of the gear 19 and the location of said wrist pin is diametrically opposite to the point of mounting of said gear on the shaft 18, and said points are equally spaced from the center of the gear. A bracket 26 is formed on the upper portion of the machine head 10, extends laterally therefrom opposite to the ear 17, and is turned up at its outer end. A rocking lever 27 is fulcrumed at one end on the outer end portion of the bracket 26, extends transversely above the machine head 10, and is pivotally connected at its opposite end to the upper end of the pitman 24. The upper end of the pump rod 11 is pivotally connected to and intermediate the ends of the rocking lever 27 and is adapted to be raised and lowered thereby.

Any desired means, such as are common and well known, may be employed for keeping the wind wheel (not shown) to the

wind, the machine head 10 rotating on its axis for such purpose.

In the practical operation of this mechanism the shaft 14 is driven by the wind wheel and drives the gear 15. The gear 19 is held in mesh with the gear 15 by gravity and by the tension of the spring 21 and is driven by said gear 15, the swinging arm 16 allowing the gear 19 to rise and fall during its rotation. The rotation of the gear 19 oscillates the pitman 24 and lever 27, thus raising and lowering the pump rod 11. The rocking of the lever 27 will cause some lateral movement of the upper end of the pump rod, which is permitted by its loose mounting in the tubular head 10. When the parts are in the position shown by solid lines the operation of raising the pump rod has commenced and, owing to the arrangement of the pivotal connections of the arm 16 and pitman 24 to the gear 19, leverage on said gear is greatest at this point and continues relatively great during travel of the pitman from lowermost to uppermost position; that is, when the load is being lifted and the work to be performed is greatest. When the parts are in the position shown by dotted lines in Fig. 1 the lowering operation is about to commence, and the relative points of application of the arm 16 (fulcrum) and pitman 24 (load) being practically reversed with respect to the gear 15 (power), the leverage is decreased during travel of the pitman 24 from uppermost to lowermost position; that is, when the amount of work to be performed is relatively small.

I claim as my invention--

1. In a driving gear, a suitable support, a driven shaft journaled for rotation in said support, a gear concentrically mounted on said shaft, a member mounted for reciprocation, a lever fulcrumed at one end on said support and pivoted intermediate of its ends to said reciprocating member, an arm pivoted at one end to said support, a shaft journaled for rotation in the opposite end of

said arm, a gear eccentrically mounted on said latter shaft and meshing with the first gear, yielding pressure devices connecting said support and said arm, and a pitman pivoted at one end to said second gear and at the opposite end to the free end of said lever.

2. In a driving gear, a suitable support, a driven shaft journaled for rotation in said support, a gear intimately associated with said shaft, a member mounted for reciprocation, a lever fulcrumed at one end on said support and pivoted intermediate of its ends to said reciprocating member, an arm pivoted at one end to and depending from said support, a shaft journaled for rotation in the free end portion of said arm, a gear eccentrically mounted on said latter shaft and meshing with the first gear, yielding pressure devices normally acting to hold said gears in mesh, and driving connections between said second gear and said lever.

3. In a driving gear, a tubular support, a driven shaft journaled for rotation in said support, a gear concentrically mounted on said shaft, a member mounted for reciprocation through said tubular support, a lever fulcrumed at one end on said support and pivoted intermediate of its ends to said reciprocating member, an arm pivoted at one end to said support, a shaft journaled for rotation in the free end of said arm, a gear eccentrically mounted on said latter shaft and meshing with the first gear, yielding pressure devices between and connecting said support and the free end of said arm, and a pitman pivoted at one end to said second gear and at the opposite end to the free end of said lever.

Signed by me at Montezuma, Iowa, this 16th day of February, 1911.

CARL J. ZIRBEL.

Witnesses:

J. G. WINGET,
JOSEPH MORRIS.