

(No Model.)

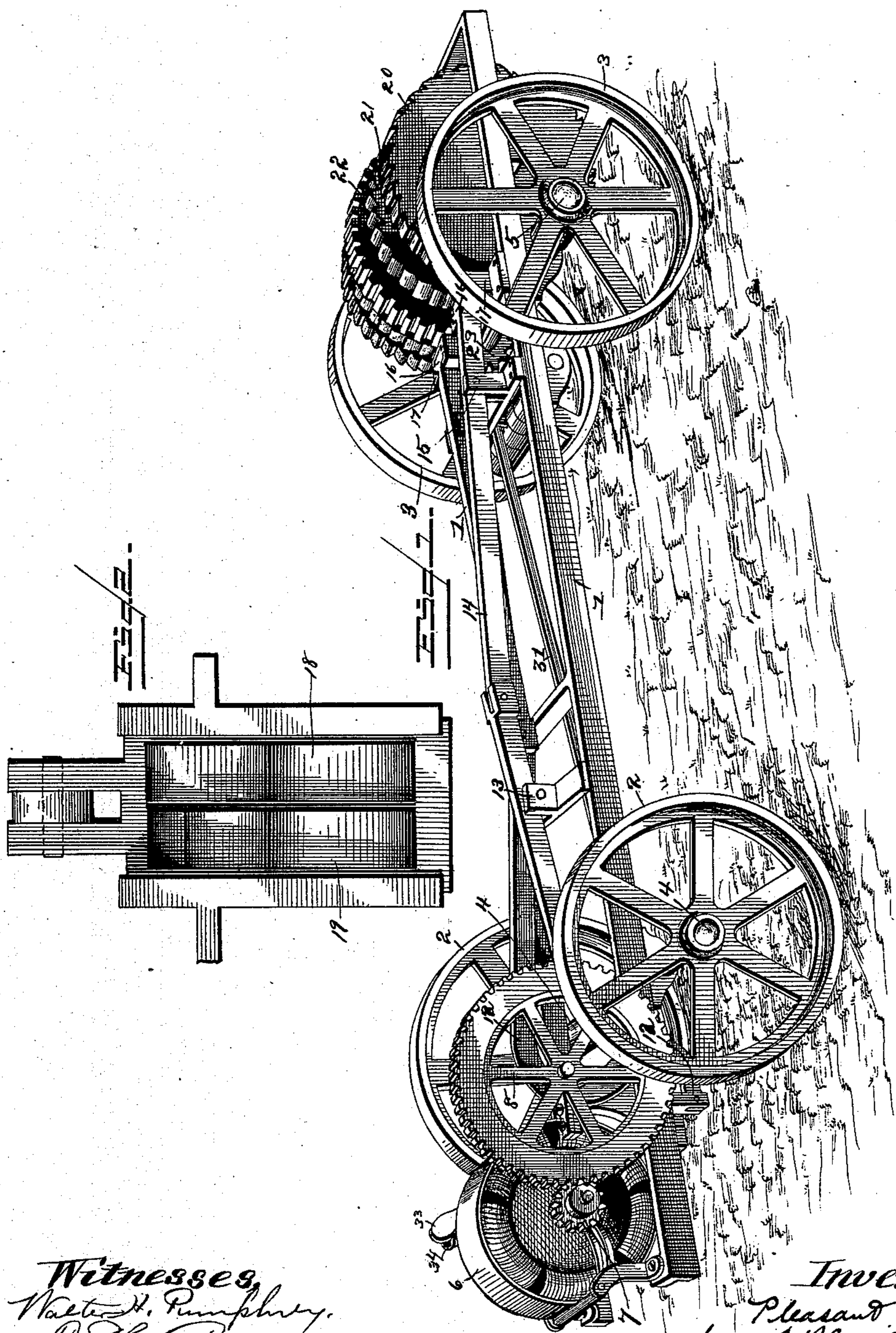
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P. HOCKETT.

## GEARING FOR HIGH SPEED MOTORS.

No. 412,754.

Patented Oct. 15, 1889.



Witnesses,  
Walter H. Humphrey.  
J. H. Brown

*Inventor,  
Pleasant Hooked  
by A. Smith  
his Attorney.*

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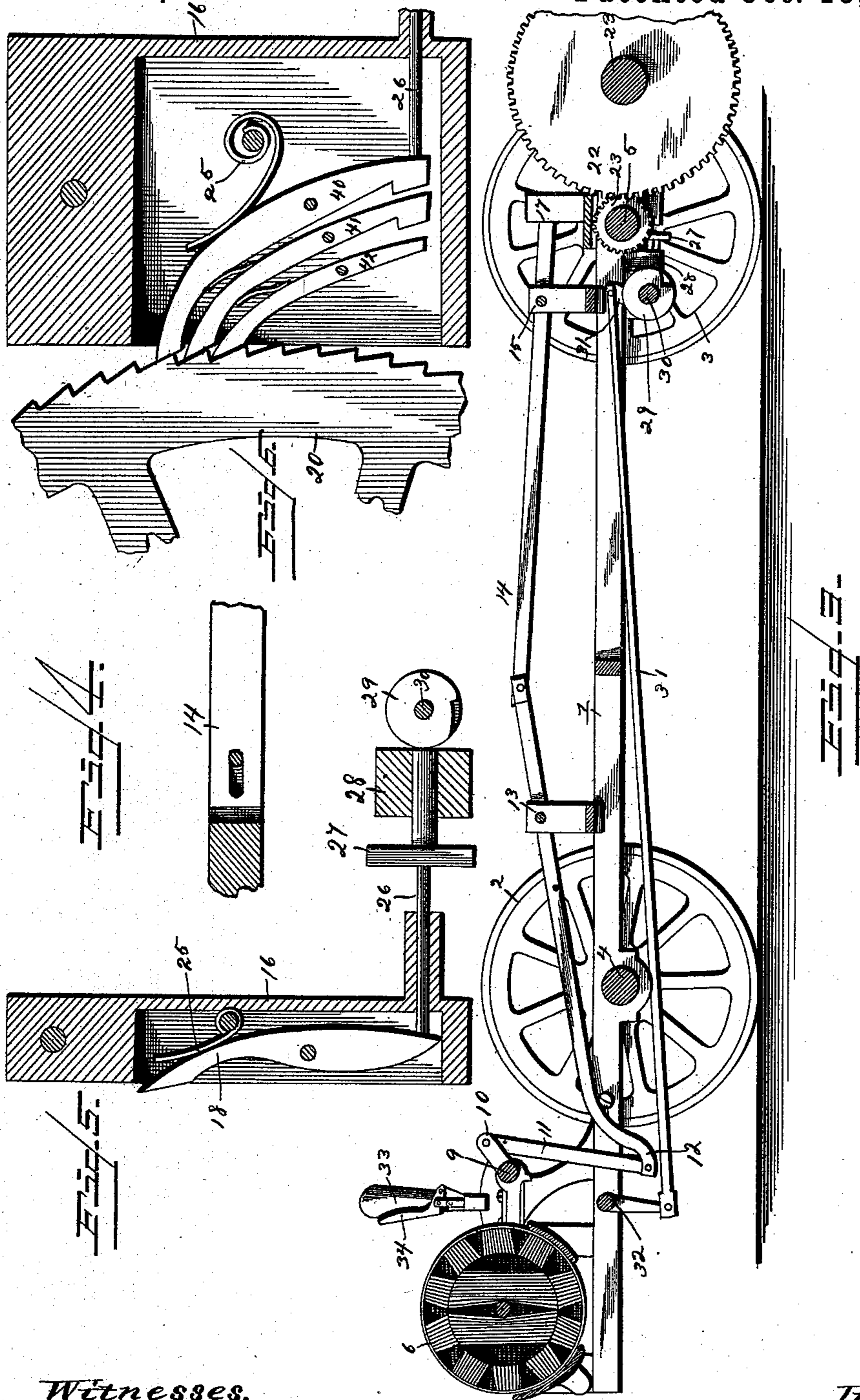
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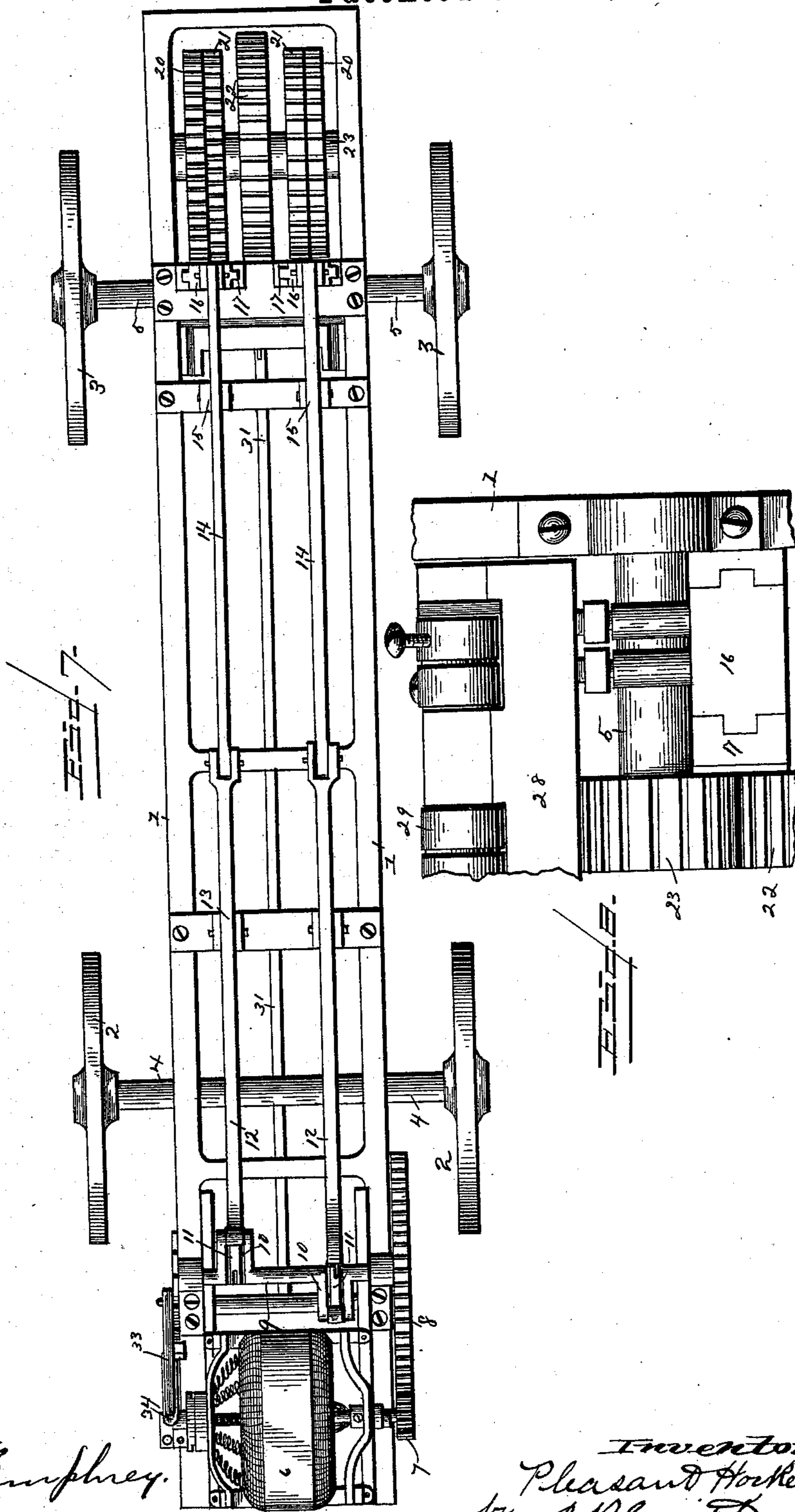
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# UNITED STATES PATENT OFFICE.

PLEASANT HOCKETT, OF COLORADO SPRINGS, COLORADO.

## GEARING FOR HIGH-SPEED MOTORS.

SPECIFICATION forming part of Letters Patent No. 412,754, dated October 15, 1889.

Application filed February 12, 1889. Serial No. 299,673. (No model.)

### *To all whom it may concern:*

Be it known that I, PLEASANT HOCKETT, a citizen of the United States, residing at Colorado Springs, in the county of El Paso and State of Colorado, have invented certain new and useful Improvements in Gearing for High-Speed Motors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention consists in the hereinafter described and claimed improvement in gearing to be employed in controlling and applying the power derived from any continuously and rapidly revolving motor to the propulsion of railway-cars or other vehicles.

In the drawings, Figure 1 is a perspective view of the gearing as applied to an electric motor. Fig. 2 is a detail view of the pawls for the double ratchet-gear. Fig. 3 is a longitudinal vertical section. Fig. 4 is a detail view of the joint between the reducing-levers. Fig. 5 is a vertical section through a part of the ratchet-gearing. Fig. 6 is a similar view showing a modification. Fig. 7 is a plan view of the gearing, and Fig. 8 is a detail bottom view of a part of the reversing-gear.

Like reference-figures refer to the same parts in all the views.

1 is the main frame or bed-frame of the car, having the supporting and driving wheels 2 3 and the axles or shafts 4 5. The wheels 3 are keyed to the driven shaft 5, so that they must revolve with it.

6 is an electric motor resting on the frame 1. It may be supplied with current from secondary batteries in the car, or in any other way desired.

Upon the armature-shaft, which revolves at a high velocity, is the pinion 7, that meshes with the gear-wheel 8, which is keyed upon the driving-shaft 9, having the double cranks 10. Connecting-rods 11 transmit motion to the first set of reducing-levers 12, which are pivoted on the main frame at the point 13. The first set of reducing-levers 13 are forked at the ends, and have pins passing through slots in the end of a second set of reducing-levers 14, which are pivoted to the main frame at the point 15. The levers 14 are connected to suitable reciprocating pieces 16,

as shown in Figs. 1 and 2, which pieces 16 reciprocate in guides 17, attached to the main frame. Each of the reciprocating pieces 16 carries two spring-pawls 18 and 19, for engaging the ratchet-wheels 20 and 21, which, together with a large gear-wheel 22, are all keyed upon a shaft 23. The teeth of the ratchet-wheel 20 face in one direction, and it is driven by the pawl 18. The teeth of the ratchet-wheel 21 face in the opposite direction, and this wheel is turned in the opposite direction by the hook-shaped pawl 19. Consequently the gear-wheel 22, and with it the pinion 23, the driven shaft 5, and the driving-wheels 3, will be turned in one or the other direction as the pawl 18 or the pawl 19 is allowed to engage with its corresponding ratchet-wheel. To control this the device illustrated in Figs. 3, 5, and 8 is employed. These pawls are forced into engagement by the springs 25. They can be held out of engagement by the plungers 26, mounted in the continuously-reciprocating piece 16. The outer end of each of the plungers 26 bears against and slides up and down upon the broad face of a second plunger 27, which is mounted in a suitable stationary part 28 of the main frame. The plunger 27 is controlled by the cam 29, which is mounted on the shaft 30. The position of the cam-shaft 30 is controlled by the link 31, the crank-shaft 32, and the reversing-lever 33, which has any suitable latch 34.

Fig. 6 illustrates my form of compound ratchet-gearing. It will be seen that if the pawl 18 should fall upon the edge of one ratchet-tooth it would have to travel a distance nearly equal to the pitch of the ratchet-wheel before it brought up against the face of the next tooth. To avoid this, I have the two or more individual pawls 40 41 42, each spring-pressed, and so spaced that one will bring up against a tooth before the ratchet-wheel has traveled a distance equal to one-half its pitch, if there are two pawls, one-third, if there are three, and so on. They are all lifted out of engagement at will by the plunger 26, as before.

The mode of operation of my invention is obvious from the above description. The electric motor runs at a high rate of speed continuously and in one direction. The

speed is reduced by the pinion and gear 7 and 8, and by the reducing-levers 12 and 14, so that the pawls move slowly, but with great force. The ratchet-wheels 20 and 21 and the gear-wheel 22 revolve with corresponding slowness; but the pinion 23 multiplies this motion to the desired speed for the propulsion of the car. Either the pawl 19 or the pawl 18, or neither of them, engages with its ratchet-wheel as the reversing-lever 33 is in one or the other of its extreme positions, or midway between them, and the car is correspondingly driven forward or backward or stands still. The two cranks 10 are set one hundred and eighty degrees apart, as shown in Fig. 7.

Some of the advantages of my invention are these: It allows the motor to be placed at the end of the car, high up and out of the dirt. It does not require the electrical connections to be exposed to the flying slush of the streets, or to be subjected to the possibility of being severed by contact with an obstacle. The mechanism occupies but a small vertical space and can lie close to the bottom of the car. The motor does not have to be started and stopped, and it is in starting and stopping that the electric motor is weakest and that nearly all accidents occur. It is of course well known that a double ratchet-gearing is a most convenient means for reversing and producing intermittent motion; but the ratchet can only run at a slow speed, and my invention combines the advantage of thus reducing the speed of driving motion before it reaches the ratchet with the advantage of compactness, and others above set out.

Having therefore described my invention, what I claim as new, and desire to protect by Letters Patent, is—

1. In combination with a car, a driving-shaft which revolves at high speed, suitable supporting and driving wheels, a slowly-revolving driven shaft rigidly connected with the driving-wheels, ratchet-gearing, wheels connected thereto, and suitable reducing-levers extending under the car and transmitting motion from the driving-shaft to the ratchet-gearing, substantially as described.

2. In combination with a car, an electric motor on the car, a slowly-revolving driven shaft, ratchet-gearing connected thereto, and suitable reducing-levers extending under the bottom of the car and transmitting motion from the armature-shaft of the motor to the ratchet-gearing, substantially as described.

3. In combination with a car, an electric motor on the car, a crank-shaft geared to the armature-shaft of the motor by suitable cog-wheels, a driven shaft with driving-wheels

keyed thereon, ratchet-gearing connected to the driven shaft by suitable cog-wheels, and reducing-levers extending under the car and transmitting motion from the crank-shaft to the ratchet-gearing, substantially as described.

4. In combination, a frame, a shaft turning in bearings in said frame, and a pinion keyed upon said shaft, a second shaft, a gear-wheel keyed upon this shaft and meshing with the pinion, two ratchet-wheels keyed upon said second shaft, the teeth of one ratchet-wheel facing in opposite direction to the teeth of the other, a reciprocating piece carrying spring-pawls which engage with said ratchet-wheels, suitable cams, and plungers controlled by said cams for lifting either or both of the pawls out of engagement with its ratchet-wheel, substantially as described.

5. In combination, a main frame, a ratchet-wheel, a continuously-reciprocating piece, a spring-pawl mounted on the continuously-reciprocating piece and tending to engage with the ratchet-wheel, a plunger mounted in the reciprocating piece and connected to the spring-pawl, a second plunger mounted in the main frame and having a broad face against which one end of the first plunger bears, whereby the spring-pawl may be thrown into or out of gear with the ratchet-wheel and the motion of the latter be discontinued at will, while the motion of the reciprocating piece is continuous, substantially as described.

6. The compound ratchet-gearing, which consists of the ratchet-wheel, the two or more pawls spring-pressed upon the ratchet-wheel and so spaced that only one of them can engage a tooth at one time, and the plunger for lifting them all out of engagement with the ratchet-wheel, substantially as described.

7. In combination, a main frame, two ratchet-wheels journaled in bearings in said main frame and rigidly connected together, the teeth of one of said ratchet-wheels facing in opposite direction to the teeth of the other, a continuously-reciprocating piece carrying spring-pawls which engage with said ratchet-wheels, suitable plungers, which are also mounted in said continuously-reciprocating piece, and which bear upon the spring-pawls, together with cams mounted in the main frame for controlling the said plungers, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

PLEASANT HOCKETT.

Witnesses:

J. H. THEDINGA,

H. I. BENNETT.