2 Sheets—Sheet 1.

A. A. SMITH.

Ice Velocipede.

No. 211,868. Patented Feb. 4, 1879.

Fig 1.

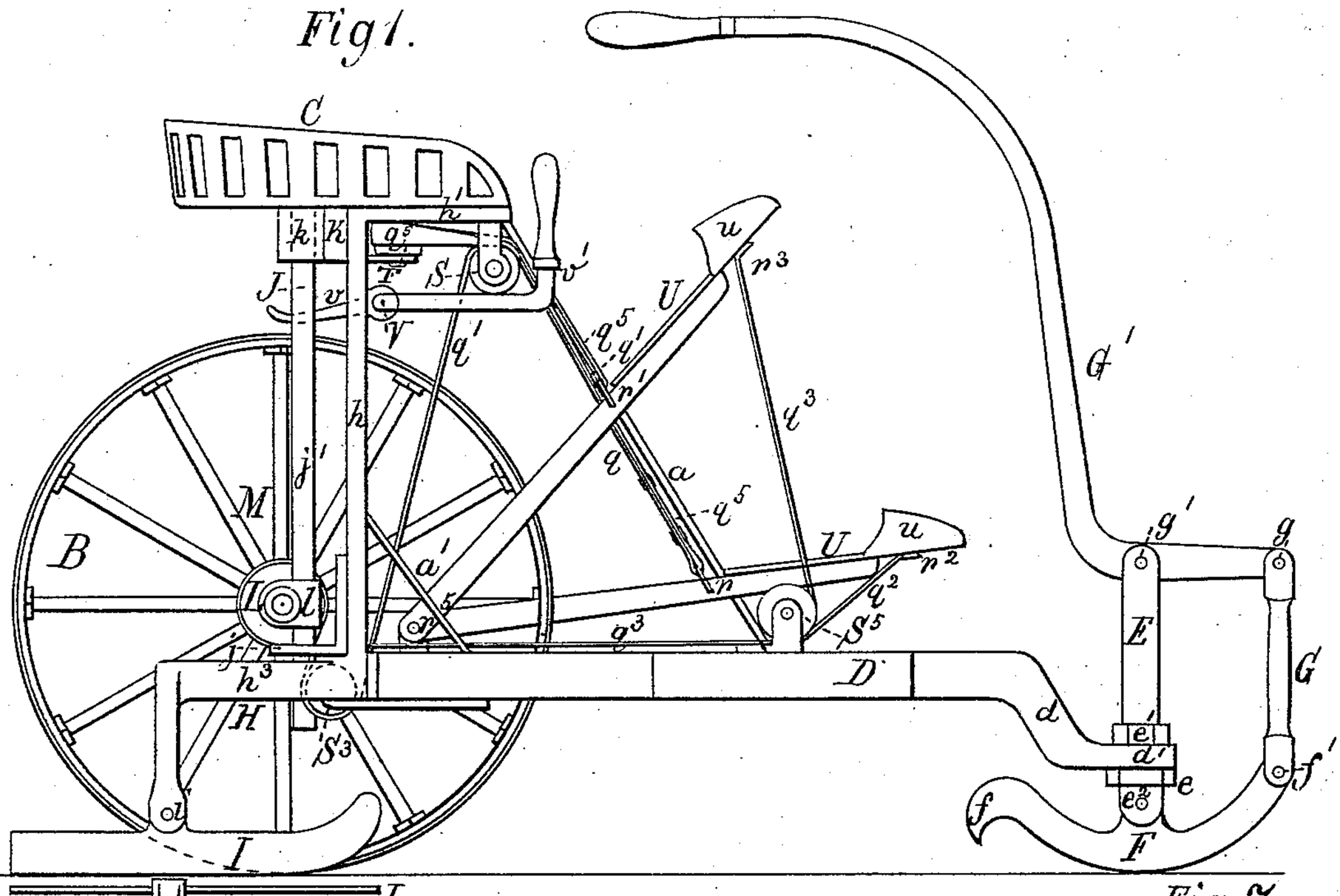

Fig 2.

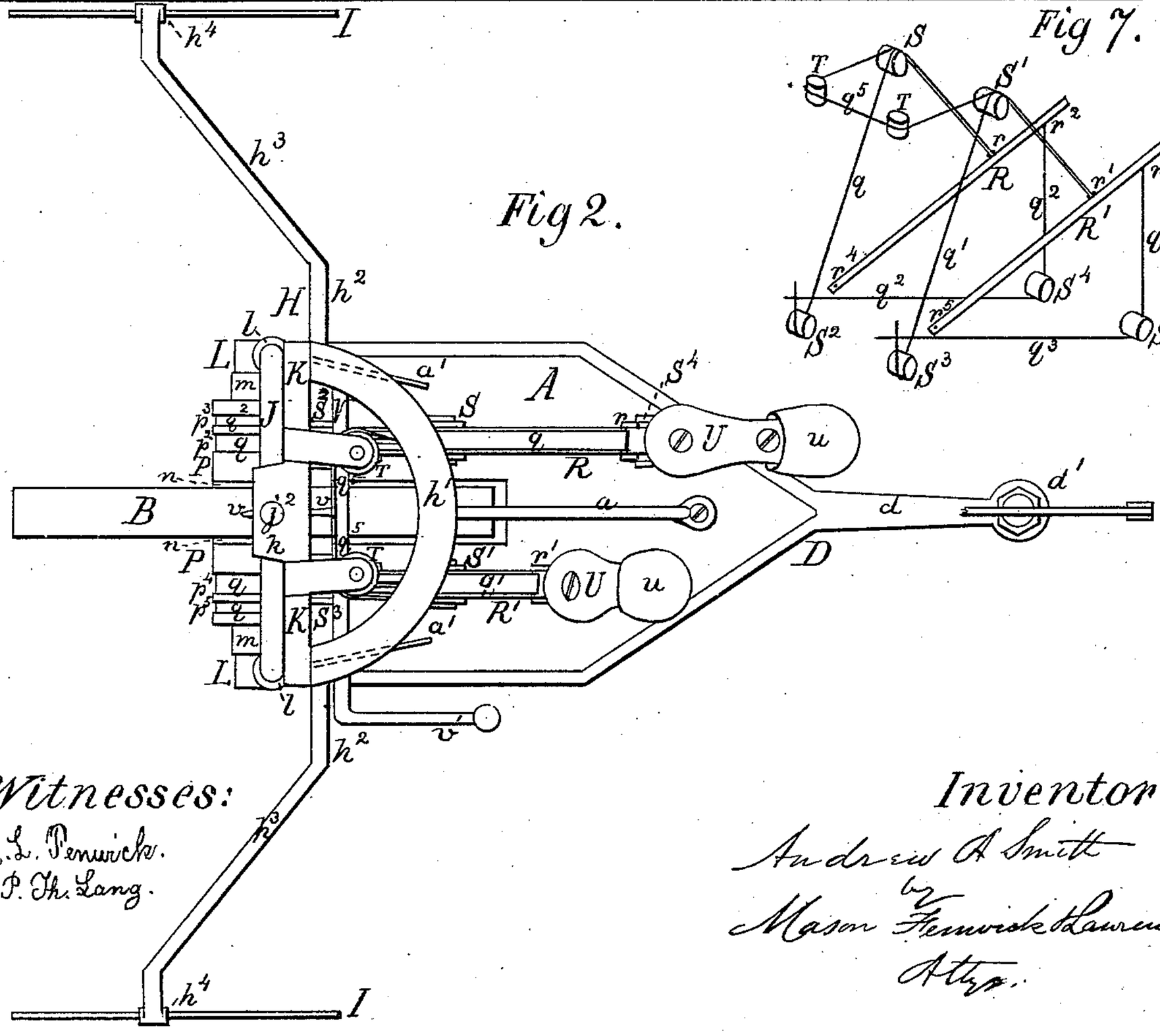

Fig 7.

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J. P. Th. Lang.

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by

Mason Fenwick & Lawrence

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2 Sheets—Sheet 2.

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Fig 3.

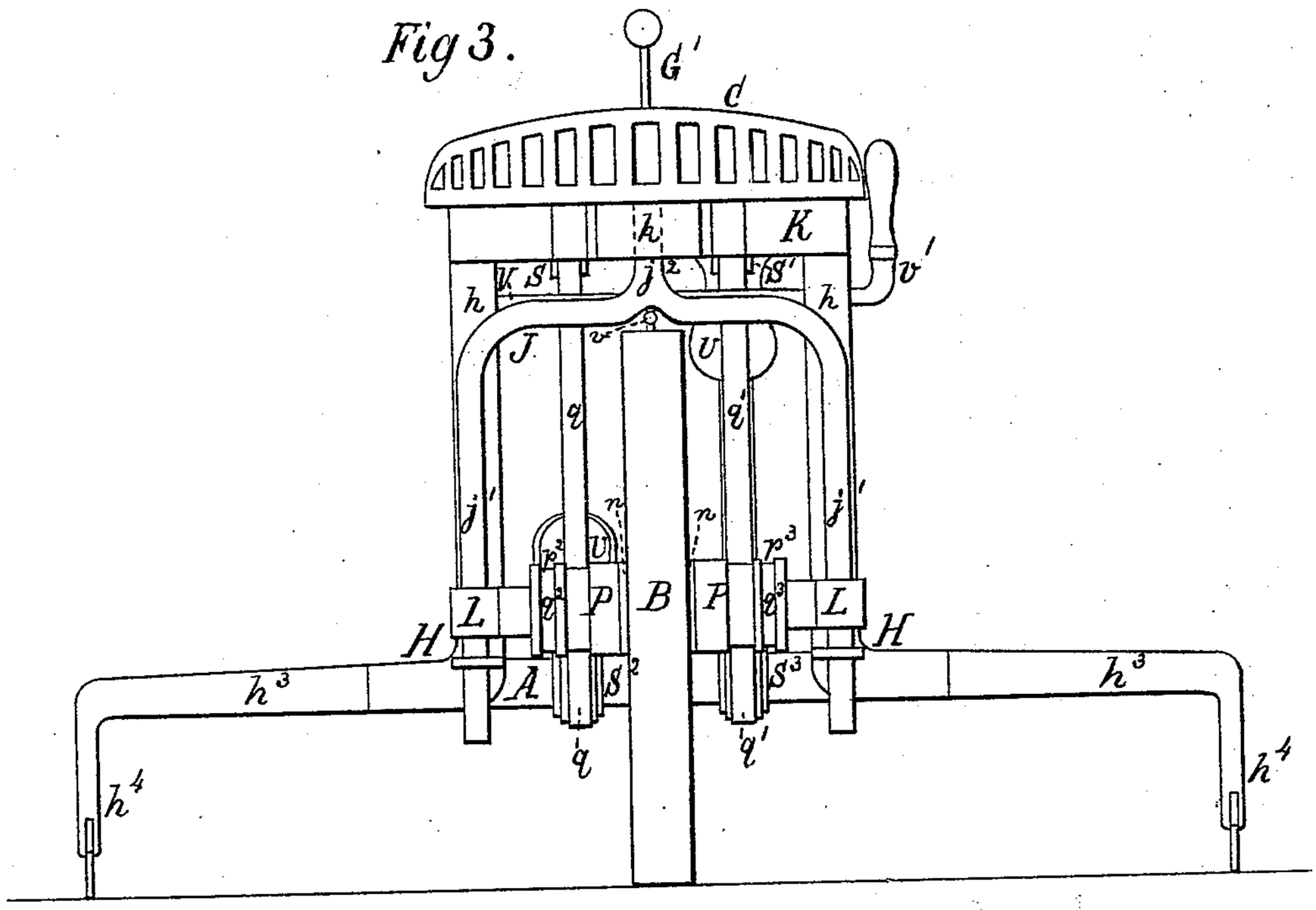


Fig 4.

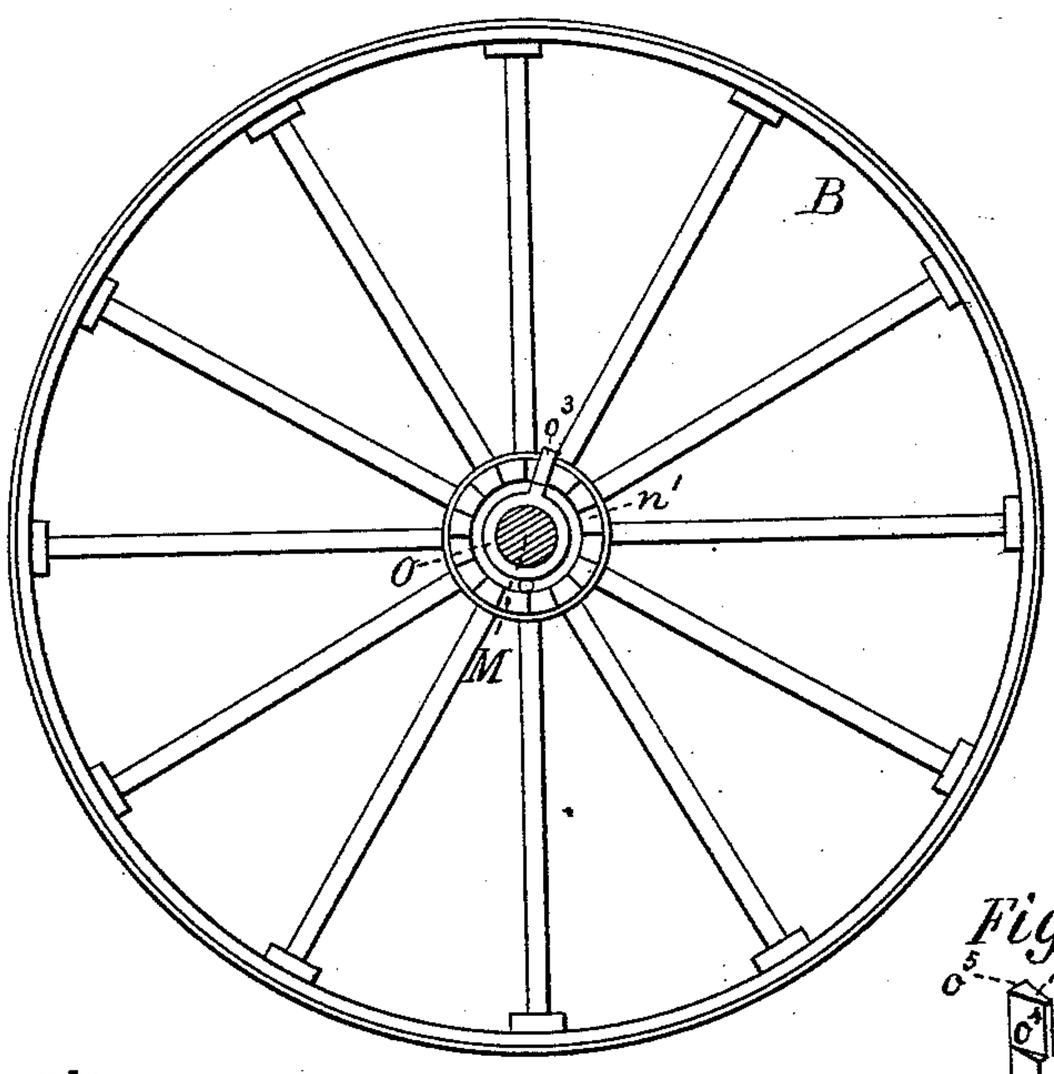


Fig 5.

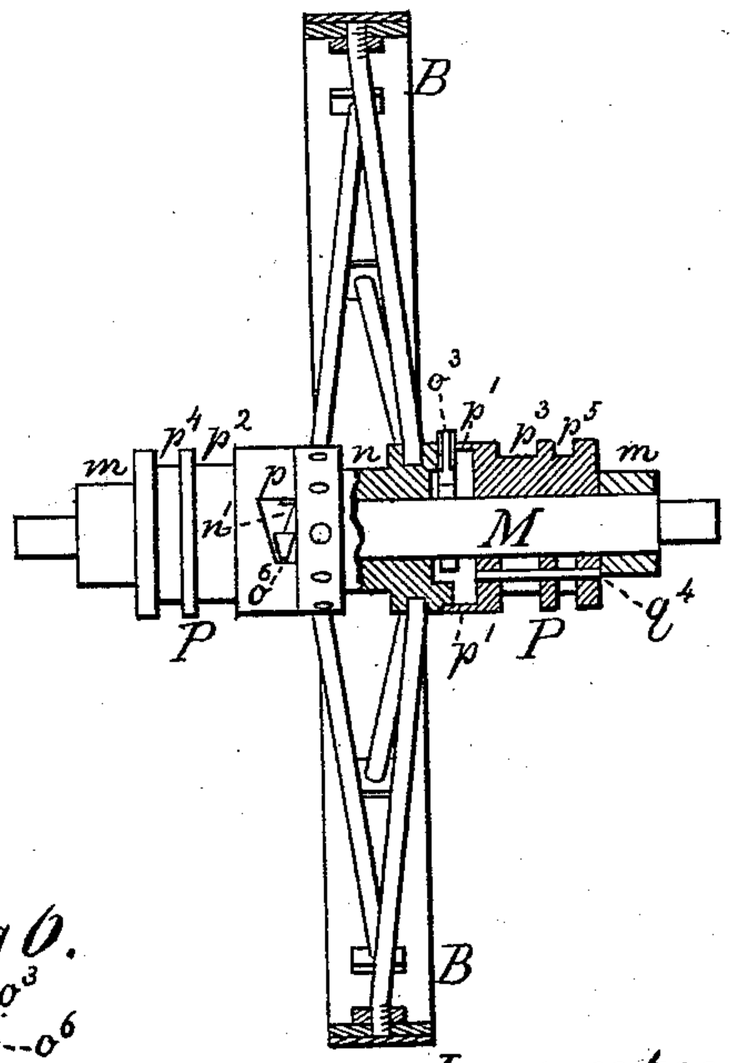
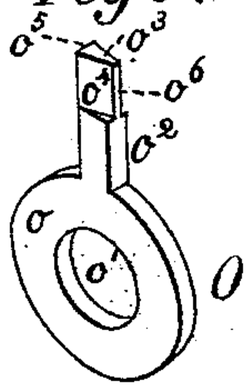


Fig 6.



Witnesses:

R. L. Fenwick.

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UNITED STATES PATENT OFFICE.

ANDREW A. SMITH, OF DENVER, COLORADO.

IMPROVEMENT IN ICE-VELOCIPEDES.

Specification forming part of Letters Patent No. **211,868**, dated February 4, 1879; application filed December 11, 1878.

To all whom it may concern:

Be it known that I, ANDREW A. SMITH, of Denver, in the county of Arapahoe and State of Colorado, have invented a new and useful Improvement in Propeller-Skates, which improvement is fully set forth in the following specification and annexed drawings, in which latter—

Figure 1 is a side elevation of my improved propeller-skate. Fig. 2 is a plan view of the same, the operator's seat being removed. Fig. 3 is a back view of the same, the seat being attached. Fig. 4 is a detail view of the ratchet-connection of the driving-wheel. Fig. 5 shows a transverse section of the driving-wheel, a partial section of its hub, and a full section of one of its driving-pulleys. Fig. 6 is a perspective view of a pawl used with the ratchet-connection of the driving-wheel and driving-pulley. Fig. 7 is a perspective diagram of the treadle-motion of my propeller-skate.

The nature of my invention consists in certain constructions, combinations, and arrangements of parts hereinafter fully described and specifically claimed, whereby is produced a propeller-skate with an improved treadle-motion, an improved ratchet-connection for the treadle-motion and propelling-wheel, an improved device for forcing the propelling-wheel down upon the ice, an improved device for raising the propelling-wheel from the ice, and a novel means for strengthening the front part of its frame.

In the drawings, A represents the platform, B a propeller-wheel, and C the seat, of the propeller-skate.

The platform A is made of wood, and is bound along its side edges by a forked metal bar, D, which is V-shaped in front, and has a goose-neck elongation, *d*, at its vertex, which elongation terminates with a head, *d'*.

The head *d'* is supported by a post, E, which is constructed to turn in said head, and is held in place against vertical movement in the head *d'* by horizontal collars *e* *e*^{1} above and below the head. The post E straddles a curved runner, F, and is pivoted thereto at *e*^{2}.

The runner, at its rear end, is provided with a hook, *f*, which turns downward, as shown.

The front end of the runner F is pivoted at *f'* to a connecting-rod, G, and by said rod it is attached at *g* to a bent lever, G', which is pivoted at *g'* to the top of the post E, and extends up and backward a convenient distance, so as to be reached by the skater from the seat C.

The rear ends of the forked bar D are suitably fastened to a frame, H, which consists of two upright bars, *h* *h*, united by an upper horizontal curved bar, *h*^{1}, and provided at, or nearly at, a level with the platform A with horizontal transverse arms *h*^{2}, which, at *h*^{3}, are bent and deflected rearward, and terminate with vertical legs *h*^{4}.

The deflections *h*^{3} prevent the arms from making a "chattering" noise, such as is experienced when the arms are made to stand at right angles to the sides of the bar D.

To the lower ends of the legs *h*^{4}, at *i*, straight runners I are pivoted.

The curved bar *h*^{1} is connected with the platform A by a brace-bar, *a*, and the bars *h* by braces *a'*.

The bars *h* are provided with angular bearings *j*, through which the parallel branches *j*^{1} of a forked bar, J, pass. The upper parts of said parallel branches *j*^{1} are united into a single center bar, *j*^{2}, which is kept in place by a vertical bearing, *k*, in a bar, K, fastened across the bars *h*.

The parallel branches *j*^{1} are tightly fitted into vertical tubular extensions *l* of horizontal bearings L, in which the shaft M of the propelling-wheel is hung.

The propelling-wheel B is loosely fitted on the shaft M, and its hub *n* is provided at each end with a ratchet-surface, *n'*, constructed to turn the wheel B forward by means of an oscillating pawl, O, and pulley P.

The pawl O is formed with a round body, *o*, with a hole, *o*^{1}, through it. On one side of this body a straight arm, *o*^{2}, is provided. This arm terminates in a prism, *o*^{3}, of trapezoidal section, having two inclined sides, *o*^{4}, a broad front, *o*^{5}, and a narrow back, *o*^{6}.

The pawl O, by means of its hole *o*^{1}, is fitted on shaft M, and the prismatic end *o*^{3} of the arm *o*^{2} is confined between the ratchet *n'* and a notch, *p*, in the pulley P. The notch *p* is cut out of a rim, *p*^{1}, of the pulley P, which

rim incloses the ratchet and pawl, as seen in Fig. 5.

The notch p is provided in a rim, p^1, of the pulley P, which rim incloses the ratchet and pawl, as seen in Fig. 5.

The notch p is of such form with respect to the termination o^3 of the pawl O that when the said termination is at the rear end of the notch it is forced into and held between the teeth of the ratchet n', and when it is at the front end of the notch it is out of range of the ratchet.

The pulleys P run loose on the shaft M, and are confined between the hub n of the propelling-wheel and the collars m, which latter are fastened to the shaft M at the ends of the pulleys.

The pulleys P are provided with annular grooves p^2 p^3 p^4 p^5, of which p^2 p^3 serve to receive and guide the driving-belts q q^1 of the treadle-motion, and p^4 p^5 to receive and guide the reversing-belts q^2 q^3 ot said motion.

The ends of all the just-mentioned belts are fastened in the usual manner to a pin, q^4, in the pulleys, and the driving-belts are wound upon the pulleys in a direction opposite that of the reversing-belts.

The belts q q^1 are fastened to treadles R R′ at r r^1, and the belts q^2 q^3 are fastened at r^2 r^3 to the said treadles, which treadles have their fulcra at r^4 r^5 upon the platform A.

From the treadles the belts q q^1 pass up and over guide-pulleys S S^1, suitably fastened to the curved bar h^1, and they thence pass down and over guide-pulleys S^2 S^3, suitably fastened to the end of the platform A, and at a sufficient distance below the pulleys P, in order to facilitate vertical adjustment of the wheel B upon the surface of the ice in a downward direction.

The belts q^2 q^3 pass down from their treadle-connections r^2 r^3 over guide-pulleys S^4 S^5, suitably fastened to the platform A, and from there they pass toward the pulleys P.

The treadles are connected by a belt, q^5, fastened at r r^1. This belt q^5 passes up from one fastening, r, over the guide-pulley S, thence over two vertical pulleys, T, in a horizontal and transverse direction, and thence over the pulley S^1 down to its other fastening, r^1.

The arrangement of the belts q q^2 and q^1 q^3 and their guide-pulleys serves to cause the treadles in their downward movement to revolve the pulleys P forward, and in their upward movement to revolve the pulleys P backward. It also serves to keep the shaft M secured in position, as the belts q^2 q^3 prevent the belts from unwinding from the pulleys q q^1, and thereby permitting the shaft M to rise higher than is proper for the successful operation of the wheel B.

By the arrangement of the belt q^5 and its guide-pulleys, one treadle is caused in its downward movement to move the other treadle up, and vice versa.

The swinging ends of the treadles are provided with foot-boards U and with caps u, of sheep or buffalo skin, whereby the operator's feet are kept steady and warm.

Below the seat C a transverse shaft, V, is suitably hung to the bars h. It is provided with a lever, v, which passes back under the center bar, j^2, of the forked bar J, and with a hand lever, v', which extends up and forward to a suitable position alongside the seat C.

Operation: The operator occupies the seat C with his feet on the treadles, and with one foot forces the treadle R down, whereupon the belt q revolves its pulley P forward, and thereby winds the belt q^2 up in the groove p^3. The small side of the notch p in the said pulley thus abuts against the narrow back o^6 of the ratchet O, and causes the pawl to enter between the teeth of the ratchet-surface n' of the wheel B and revolve the same forward. At the same time the belt q^5 raises the other treadle, R′, up, and causes it to unwind the belt q^3 from its pulley P, which thus winds up the belt q^1. In doing this the said pulley revolves backward, and the wide side of its notch p abuts against the front side, o^5, of the pawl-arm o^2, and thus causes the pawl to glide over the teeth of the ratchet-surface on the hub of the wheel B. As the belts q q^1 unwind from their pulleys P P in a downward direction, the power necessary for moving the wheel B produces a downward strain upon the shaft M and wheel B, and constantly keeps the wheel upon the surface of the ice; and thus the greater the power required to revolve the wheel B the harder will be the bite of the wheel upon the ice; and as the seat of the operator is directly above the wheel B, the operator's weight is mainly thrown upon the said wheel instead of upon the runners, and thus the machine, under all circumstances, is rendered light and easy of movement. When the machine is under full speed and the wheel B is not required to be in action upon the ice, the operator presses the lever v' down, and thereby lifts the wheel B up from contact with the ice, and thus saves the propelling mechanism from unnecessary wear.

The runners I and F and the lever G′ operate the same as in my former patent, and therefore require no further description of their operation.

It is obvious that the treadle-motion herein described may be used to move various machines—such as grindstones, sewing-machines, and hand-cars on railroads.

I claim—

1. The combination of the treadles R R′, belts q q^1 q^2 q^3 q^5, having guide-pulleys S S^1 S^2 S^3 S^4 S^5, the pulleys P, wheel B, and ratchet-connection O p n', substantially as and for the purpose set forth.

2. The combination of the pulley P, having a notch, p, shaped as described, the pawl O, having a head, o^3, with inclined sides o^4, broad front o^5, and narrow back o^6, and the ratchet-surface n' of a driving-wheel, B, substantially as set forth.

3. The combination of the deflecting guide-pulleys S^2 S^3, belts q q^1 q^2 q^3, and pulleys P of the wheel B, substantially as and for the purpose described.

4. In a propeller-skate, the combination of a shaft, V, having levers v and v', and the vertically-sliding forked bar J, whereby the wheel B may be raised from the surface of the ice, substantially as set forth.

5. The vertically-sliding propelling-wheel B, adjusted downwardly by means of the treadle-motion during its operation, and upwardly by means of the shaft V and and levers v v', substantially as and for the purpose described.

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Witnesses:

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