

No. 706,783.

Patented Aug. 12, 1902.

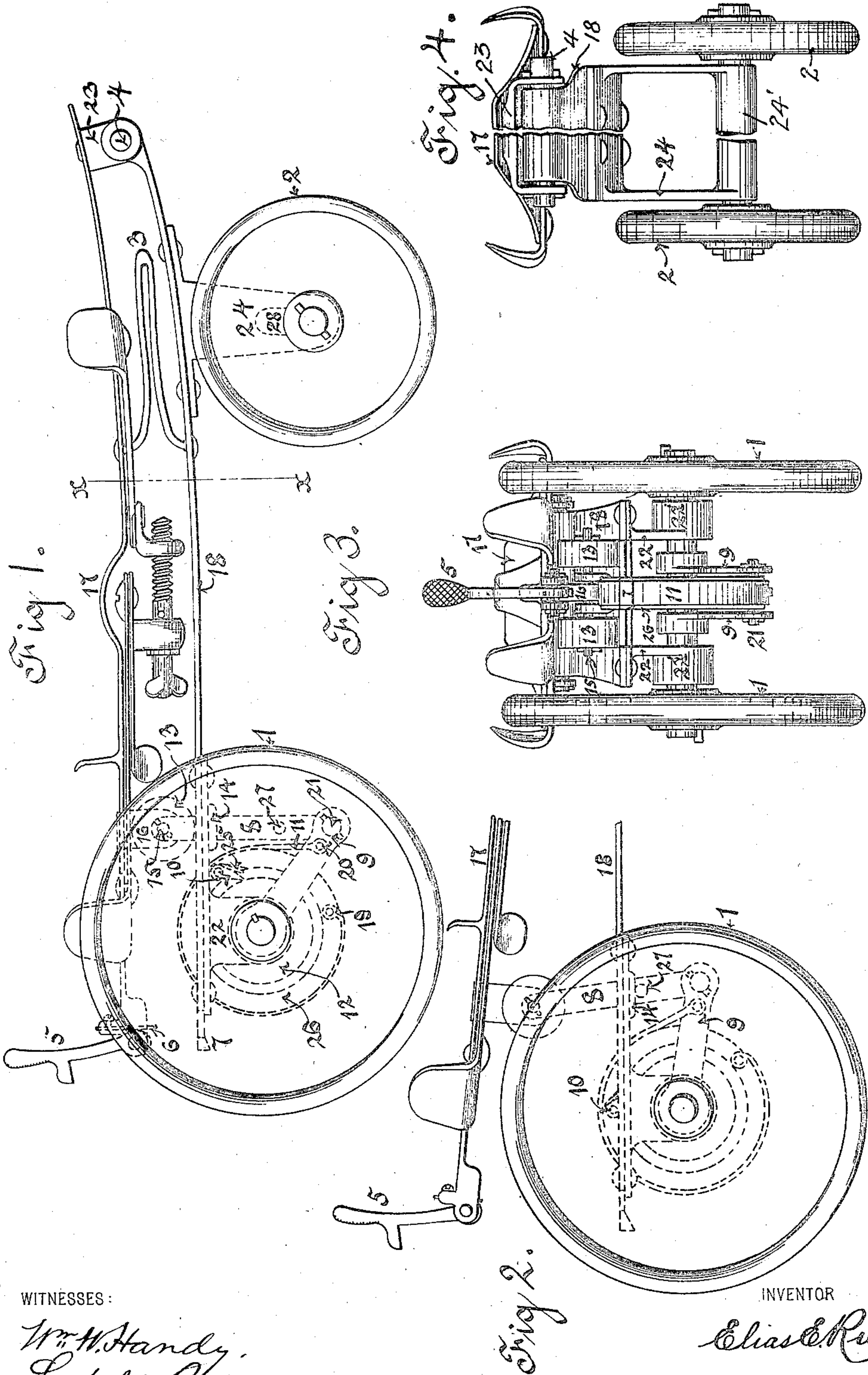
E. E. RIES.

AUTOMATIC CYCLE OR BICYCLE SKATE.

(Application filed May 8, 1897, Renewed Dec. 28, 1901.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

W. H. Handy,
Leopold Ries.

INVENTOR

Elias E. Ries.

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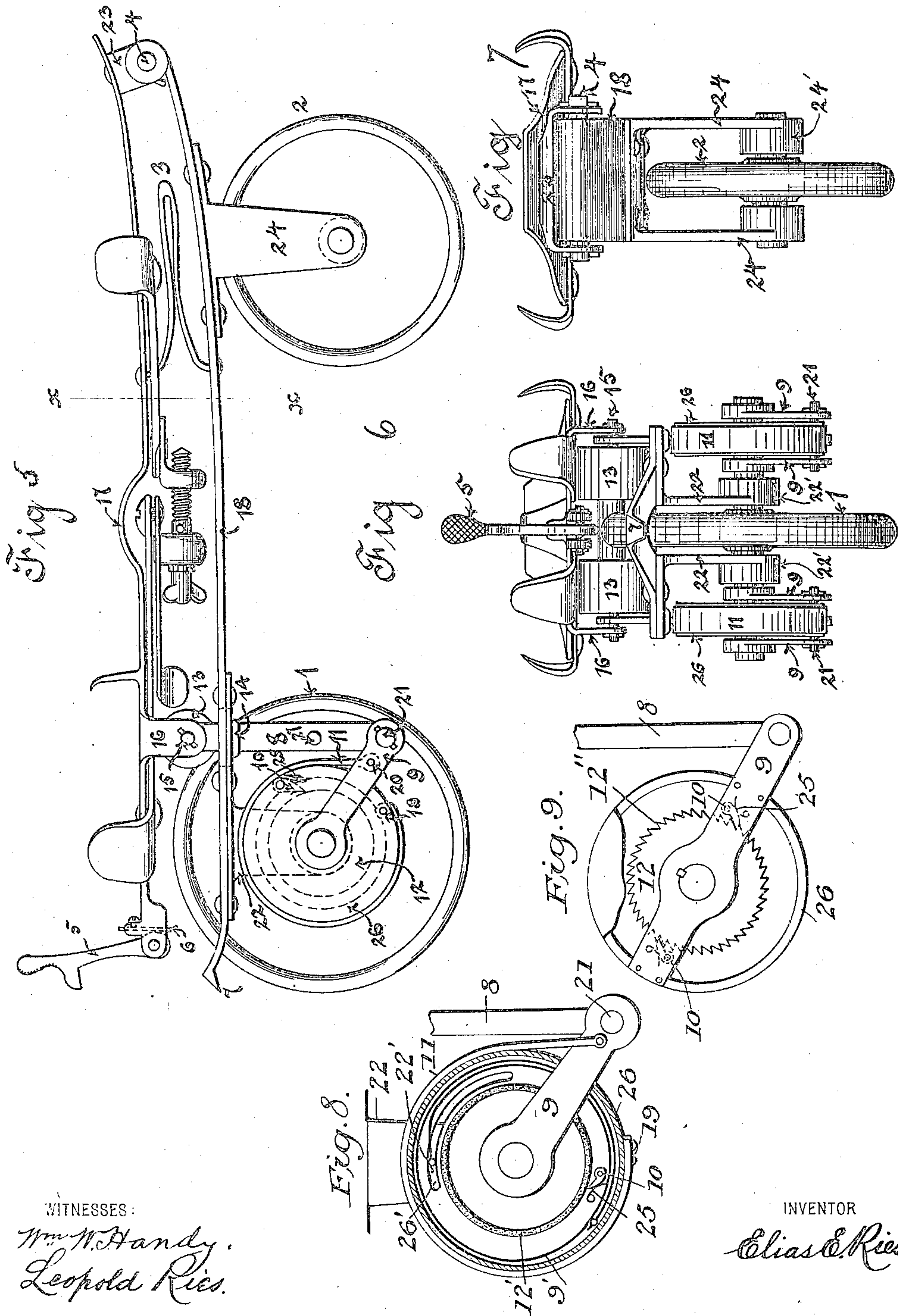
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2 Sheets—Sheet 2.



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Wm. W. Handy.
Leopold Ries.

INVENTOR
Elias E. Ries.

UNITED STATES PATENT OFFICE.

ELIAS E. RIES, OF NEW YORK, N. Y.

AUTOMATIC CYCLE OR BICYCLE SKATE.

SPECIFICATION forming part of Letters Patent No. 706,783, dated August 12, 1902.

Application filed May 8, 1897. Renewed December 28, 1901. Serial No. 87,627. (No model.)

To all whom it may concern:

Be it known that I, ELIAS E. RIES, a citizen of the United States, and a resident of New York, in the county and State of New York, have invented certain new and useful Improvements in Automatic or Self-Acting Cycle or Bicycle Skates, of which the following is a specification.

My invention relates to apparatus for individual locomotion, and has for its object to provide means for producing a rapid and continuous motion or travel over ordinary surfaces or roads by simply transferring the weight of the body from one foot to the other in a manner similar to the ordinary act of walking. I accomplish this object by constructing an automatic or self-acting skate comprising, broadly speaking, two coöperative parts, one of which is provided with means of attachment to the foot or shoe of the wearer and constitutes what may be termed the "foot-plate" of the skate and the other of which constitutes the framework or, as hereinafter termed, the "base-plate," which carries the driving mechanism, the parts being so constructed and arranged that a reciprocating motion of the foot-plate is converted into a forward motion of the skate, and I also provide means for normally separating the foot-plate from the base-plate, so that as the weight of the body is thrown to one side and the foot-plate on the other side is relieved of this weight this foot-plate automatically rises or separates itself from the base-plate.

In the accompanying drawings, Figure 1 is a side elevation of my improved skate, illustrating the position of the parts when the foot-plate is depressed and showing the driving mechanism in dotted lines. Fig. 2 is a side elevation of the rear portion of the skate, showing the position of the parts when the foot-plate is in its raised position. Fig. 3 is a rear elevation of the skate, showing the driving-gear. Fig. 4 is a sectional rear elevation of the skate on line *x x*, Fig. 1, showing the front or pilot wheel. Figs. 5, 6, and 7 are views similar to Figs. 1, 2, and 4, respectively, showing a modified construction for a two-wheeled or bicycle skate. Fig. 8 is a detail view of the clutch mechanism shown in Figs. 1, 2, and 5; and Fig. 9 shows a slight modification of this device.

Referring to Fig. 1, the skates herein illustrated have the general appearance of ordinary roller-skates. They differ from these, however, in that the rear wheels (or wheel) 1 and the forward wheels (or wheel) 2, which in my skate constitute the driving and pilot wheels, respectively, are not mounted upon the foot-plate 17 directly, but run between bearing-forks 22 24 of any suitable form, carried by the independent base-plate or frame 18, with which the foot plate or rest 17 is connected by a pivotal or hinge connection of proper character to permit a bodily up-and-down movement of said foot-plate with reference to the base-plate or frame. As an example of such connection the drawings show a pin 4, which passes through ears on the forward end of the base-frame 18 and through lugs or ears 23, projecting downward from the foot-plate.

In this description and following claims the term "base-plate" will be used as meaning any frame or structure provided with or affording bearings for the wheel or wheels of the skate and also a support for the foot "plate" or "rest," by which latter term is meant any support adapted to be secured to the foot and affording a rest or support therefor, which will under the weight of the user be moved bodily downward between the base plate or frame.

The foot-plate 17 as well as the base-plate 18 are preferably made of thin sheet iron or steel, although it is obvious that they may be made of wood or any other material. The foot-plate, as illustrated, is provided with adjustable clamps, such as are generally used on ice-skates, for ready attachment to and removal from the shoe of the wearer. Under ordinary conditions of use the foot-plate 17 is normally kept separated or at a distance from the base-plate 18 by the action of the flat spring 3 or its equivalent, which tends to hold the two portions of the skate apart, so as to cause them to diverge at the rear and to assume the relative positions shown in Fig. 2 when there is no pressure on the foot-plate. I prefer to provide, however, at the rear of the foot-plate a link or cam-lever 5, having a snap-spring 6 and adapted to engage with a locking-catch 7, formed on the rear end of the base-plate in such a manner that

the two portions of the skate may be held rigidly together when it is desired to throw the driving mechanism out of gear. The cam-lever 5 is in the form of a thumb or finger lever, so as to permit of ready manipulation while the skate is on the foot, and is, furthermore, made of such shape as to serve when elevated as a pantaloons or dress guard.

To the under side of the foot-plate 17 at a point directly or approximately under the heel is secured a lug 16, (see Figs. 1 and 3,) whose pin 15 engages with the upper end of a connecting link or rod 8 and passes through a suitable guiding and steadying slot 14 in the base-plate 18 and connects at its lower extremity by means of the pin 21 with the free ends of the driving links or forks 9 9, whose inner ends are journaled loosely upon the driving-axes. Attached to the driving-links 9 9 by means of the pin 20, preferably at or near their outer or free ends, is a flexible strap or band 11, of leather or other suitable material, which extends partly around the periphery of a drum 26, to which drum the other end of the strap 11 is fastened at 19, as indicated more clearly in Fig. 8. This drum 26 when the construction shown in Fig. 8 is used is mounted loosely upon the driving-axle independently of the driving-links 9 9 and contains a coiled spring 9', one end of which is secured to the inner periphery of the drum-casing 26, the other end being attached to a stud 22', secured to the driving-wheel fork (or forks) 22, the drum-casing being provided with a curved slot 26', designed and adapted to clear the stud 22' when the drum is rocked about the driving-axle under the opposing influence of the driving-links 9 9 and spring 9'. I prefer, however, instead of using the spring 9' and the strap 11 for moving the drum to employ the arrangement shown more clearly in Fig. 9, in which the driving-links 9 9 form an integral part of or are rigidly secured to the casing of the drum 26, so that the drum is directly and positively operated or rotated in both directions by the links 9 9 when the connecting-rod 8 is raised and depressed by the motion of the foot-plate 17.

Within the casing of the drum 26 and keyed firmly to the driving-axle is a friction pulley or gear 12. The face or periphery of this pulley may be provided either with a covering 12', of leather or other yielding material, as shown in Fig. 8, or with ratchet-teeth 12'', as shown in Fig. 9. A pawl or pawls 10 10, fastened to the inner side of the drum, Fig. 8, or to the inner side of the links 9 9, Fig. 9, and pressed forward by the pawl spring or springs 25, bear upon the face of the pulley 12 in such a direction that when the connecting-rod 8 is depressed they will operatively engage with the face of the driving-pulley, so as to rotate it, together with its driving axles and wheels, in a forward direction, but will slide freely over the face of the pulley while the connecting-rod 8 is moving upward or while the skate is moving forward under

the influence of acquired momentum on the part of the user. It will therefore be apparent that the driving axle and wheels are at all times free to move or rotate in a forward direction, but are locked against backward rotation.

The construction of the driving mechanism illustrated in Figs. 5, 6, and 7 of the drawings is similar to that just described with the exception that there are used with the bicycle-skates two drums, one at each side of the single driving-wheel therein shown, (in order the better to equalize and distribute the pressure,) and two pairs of driving links or forks, whose connecting-rods 8 engage with a pin 15, mounted between the two depending ears 16 16, formed in this instance by turning down the metal at either side of the heel-plate, as shown in Fig. 6. On the body of the connecting rod, pin, or shaft 15 are mounted cushions or buffers 13 13, of rubber or other yielding material, for the purpose of limiting the downward sweep of the foot-plate 17 and to serve as a cushion between the foot-plate 17 and the base-plate 18 at the end of each stroke or movement of the foot-plate, as well as to increase the elasticity between the foot and base plates when the two parts are united by the link or cam-lever 5. The connecting rod or rods 8 are also provided with a pin or with a common shaft 27, which limits the upward sweep of the foot-plate and which is either itself provided with a similar cushion or preferably bears against a fixed cushion 14, extending across the under surface of the base-plate in line with the guiding-slot, through which the connecting rod or rods pass. The stroke of the connecting-rod 8 is in practice so adjusted with respect to the diameter of the driving-drum 26 and the radius and leverage of the driving-links 9 9 that without an undue lifting or separation of the foot-plate 17 from the base-plate 18 the driving wheel or wheels will be forced to turn one or more complete revolutions or, if proportioned as shown in the accompanying drawings, a definite part of a revolution each time the foot-plate 17 is depressed. It will be evident that by a suitable arrangement of the driving-gear any desired ratio of revolution for a given motion of the foot-plate may be obtained.

In my four-wheeled cycle-skate shown in Fig. 1 the rear or driving wheels are placed somewhat behind and close to the sides of the heel-support of the foot-plate, thus permitting the latter to rise and fall between them. This construction enables me to use driving-wheels of comparatively large diameter without unduly raising the center of gravity of the wearer of the skates and without obstructing the freedom of his movements by reason of the proximity of and the possible interference between the driving-wheels of both skates, due to the natural or usual divergent position of his foot. The pilot-wheels are preferably placed under the forward part of

the skate well to the front and may therefore be of smaller diameter. The distance between the two wheels of each pair in this type of skate is sufficient to give a broad and stable base or support to each foot.

In the two-wheeled or "bicycle" skate modification or type of my invention illustrated on Sheet 2 the driving-wheel is necessarily in the longitudinal center of the skate. The base-plate is therefore provided with an opening or slot to permit of the free passage through the same of the upper portion of the driving-wheel, which latter is reduced in diameter to a sufficient extent to prevent the foot-plate 17 from coming in contact with it.

The operation of my automatic or self-acting cycle-skate is as follows: When one foot is lifted, as in the act of a slight forward step, the pressure on spring 3 is relaxed, thereby causing it to separate the foot-plate and base-plate and to lift the connecting-rod 8 until the links 9 and drum 26, with its clutch mechanism 10, are moved backward and set in the position shown in Fig. 2. On now throwing the weight onto this foot the foot-plate commences to descend bodily with a considerable force toward the base-plate 18, moving the connecting rod or rods 8 down with it and causing the links 9, either directly or through the strap 11, to revolve the drum 26 with its clutch devices 10 and driving-pulley or ratchet-gear 12. The downward motion of the foot-plate is thus converted by means of the impulse imparted to the fixed pulley 12 into a direct rotary motion of the driving-wheels 11, that drives the skate forward with a positive action and with a speed dependent, primarily, upon the weight of the pedestrian and upon the extent and suddenness with which the weight is transferred or applied to the foot-plate and, secondarily, upon the diameter of the driving-wheel and the ratio or leverage which the clutch or driving mechanism bears to it. Since the energy or motive force represented and imparted by the weight of the pedestrian during the travel of the foot-plate is far in excess of that required to move the skate forward a distance corresponding merely to the initial or positive motion given by the same to the driving-wheels, it follows that after the completion of the actual stroke the fixed pulley and the driving-wheels will continue to revolve and move the skate forward after the foot-plate has come to rest upon the base-plate, so that the pedestrian will be carried forward under the influence of the initial momentum imparted to the driving mechanism and to himself a distance equal to a number of complete revolutions of the driving-wheels before the skate finally comes to a standstill. It is not essential for propulsion that the skate be lifted clear of the ground at each step or thrust, (although this may be done,) it being necessary only that the foot be raised or the heel tilted sufficiently to per-

mit the foot-plate to become elevated for the whole or any fractional part of its normal stroke.

I may in some instances make provision to facilitate climbing hills, as by arranging the pilot-wheel bearing 24' so as to be vertically adjustable within grooves 28 in the front fork 24, (see Sheet 1,) whereby the pilot-wheels can, if desired, be readily raised or lowered, so that the level of the base-plate 18 and that of the foot-plate 17 (when at the lower end of its stroke) may be kept in a substantially horizontal position irrespective of the inclination of the grade or grades that may be encountered.

It may sometimes be desirable to throw the driving mechanism out of action and to use my skate as an ordinary roller-skate. For this purpose the cam-lever 5 when thrown into engagement with the catch 7 locks the foot-plate and base-plate together, so that no motion can be imparted to the connecting-rod 8.

I do not limit myself to the specific forms or construction herein described; but

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a motor-skate the combination of a base-plate or frame carrying the driving and pilot wheels, a bodily-depressible foot-plate having suitable pivotal or hinged connections with said base-plate, and driving mechanism operatively connected with said foot-plate and acting upon said driving wheel or wheels.

2. In a skate, the combination of a base-plate, with a depressible foot-plate pivotally connected to the said base-plate at the toe portion of the said foot-plate, and a guide or guides between the foot-plate and base-plate at or near the heel portion of said foot-plate.

3. In a motor-skate, the combination of a base-plate supporting front and rear wheels with a depressible foot-plate supported and guided by the base-plate, at two or more separate points in its length, and driving mechanism operated by the foot-plate.

4. In a skate, the combination of a base-plate, and a bodily-depressible foot-plate pivoted thereto, with driving mechanism operated by the said foot-plate.

5. In a skate, the combination of a base-plate with a depressible foot-plate connected to the said base-plate at the toe portion of said foot-plate, and driving mechanism operated by the said foot-plate.

6. In a skate, the combination of a base-plate, and a bodily-depressible foot-plate pivoted thereto, with driving mechanism operated by the depression of said foot-plate, and means for normally raising the said foot-plate.

7. In a skate, the combination of a base-plate supporting at its rear end one or more driving-wheels and at its forward end one or more pilot-wheels, and a bodily-depressible foot-plate mounted upon the base-plate, with

driving mechanism connecting the rear portion of the foot-plate with the driving wheel or wheels.

8. In a skate, the combination of a base-plate supporting at its rear end one or more driving-wheels and at its forward end one or more pilot-wheels, and a bodily-depressible foot-plate mounted upon the base-plate, with driving mechanism connecting the rear portion of the foot-plate with the driving wheel or wheels, and adapted to impart thereto a positive forward motion while always permitting the continual forward rotation of said driving wheel or wheels.

9. In a skate, the combination of a base-plate supporting pilot and driving wheels, and a bodily-depressible foot-plate pivoted to said base-plate, with driving mechanism and means to engage the said driving mechanism with the driving-wheel on the depression of said foot-plate and to disengage the same during the upward motion of the foot-plate.

10. In a skate, the combination of a base-plate, with a bodily-depressible foot-plate pivoted thereto, and yielding buffers or stops between the foot-plate and the base-plate, to form a cushion-stop for the foot-plate at the end of each downward movement or throw.

11. In a skate, the combination of a base-plate, and a foot-plate pivoted to the base-plate at the toe portion of the foot-plate, with a driving-wheel carried by the base-plate and driving mechanism connected to the rear end of the foot-plate.

12. In a skate, the combination of a base-plate supporting pilot and driving wheels, and a bodily-depressible foot-plate pivoted to the base-plate, with driving mechanism operated by said foot-plate, and means for locking the driving-wheel against backward rotation.

13. In a skate, the combination of a base-plate and a foot-plate pivoted thereto and means for normally separating the foot-plate from the base-plate, with driving mechanism and a driving-wheel, and a clutch adapted to engage the driving mechanism with the driving-wheel during the depression of the foot-plate and to disengage the same during the upward motion of the foot-plate.

14. In a skate, the combination of a base-plate, a foot-plate pivoted thereto, and means for normally separating the foot-plate from the base-plate, with driving mechanism and a driving-wheel, and a clutch adapted to engage the driving mechanism with the driving-wheel during the depression of the foot-plate and to disengage the same during the upward motion of the foot-plate, and an inclosing drum for said clutch.

15. In a cycle-skate, the combination with the base-plate, foot-plate and driving-axle, of a driving-gear mounted upon said axle, a reciprocating rod or rods connected respectively with the foot-plate and driving-gear, and a clutch or friction mechanism designed and adapted to be operated to engage with

the driving-gear so as to positively rotate the driving-axle when the connecting rod or rods are moved in one direction and to permit of the continued rotation of the driving-axle while the connecting rod or rods are moving in the opposite direction, substantially as set forth.

16. In a cycle-skate, the combination of the base-plate or frame, the driving-axle and a driving-gear or friction-pulley mounted rigidly thereon, an inclosing drum mounted loosely upon said axle, a bodily-depressible foot-plate connected to the drum for rocking the same upon said axle, and suitable pawl or friction-clutch devices within said drum designed and adapted to engage with the driving-gear or friction-pulley, substantially as and for the purposes set forth.

17. In a cycle-skate, the combination with the base-plate, foot-plate and driving-axle, of a connecting rod or rods secured at one end to and arranged to be moved or reciprocated by the foot-plate, one or more links or levers pivotally mounted upon the base-plate or driving-axle and adapted to be operatively engaged by the other end of said connecting rod or rods, and mechanism, substantially as described, connected with and designed and adapted to be operated by the said links or levers so as to convert the intermittent movements of the same into a progressive rotary motion of the driving-axle.

18. As a new article of manufacture, an automatic or self-acting cycle or bicycle skate comprising a base-plate or support having bearings in which the wheels or the axles forming part of, or secured to the same are free to move, a bodily-movable foot plate or support having clamps or fastenings for securing the same to the foot or shoe, said foot-plate being pivotally secured to said base-plate, means for normally lifting or separating the foot-plate from the base-plate when the foot to which the skate is secured is lifted or when its pressure upon the foot-plate is removed, and a motion-converting mechanism designed and adapted to be set into operation by the downward movement of the foot plate or support when the foot is depressed and the weight of the body is brought to bear upon it, to convert the downward movement of the foot-plate into a direct forward motion of the skate, substantially as set forth.

19. As a new article of manufacture, an automatic or self-acting cycle or velocipede skate having an adjustable foot-support pivoted at its forward end and capable of a limited reciprocating motion in a substantially vertical direction, one or more driving-wheels between the yielding foot-support and the ground or other surface of travel, and a suitable driving gear or mechanism interposed between the foot-support and the driving wheel or wheels and designed and adapted to convert the limited vertical motion of the foot-support at each thrust or stroke into an amplified forward or horizontal motion of the

said skate, substantially as and for the purpose set forth.

20. In a cycle-skate, the combination with the skate-frame, of a pilot wheel or wheels of comparatively small diameter mounted in suitable bearings under and located entirely beneath the ball or toe portion of the skate-frame, a driving wheel or wheels of larger diameter than the said pilot wheel or wheels, also mounted in suitable bearings behind or at the sides of the heel portion of the skate-frame and partially projecting above the latter, a vertically-movable foot-plate and mechanism connecting the same with the driving wheel or wheels as and for the purpose described.

21. In a cycle-skate, the combination with a frame or base-plate and a foot-plate movable with respect thereto, of one or more driving-wheels mounted in suitable bearings on said frame or base-plate, a friction-clutch mechanism for said driving wheel or wheels also mounted upon said frame or base-plate and designed and adapted to rotate the said wheel or wheels in a forward direction and to lock the same against backward movement, and pivoted rods or links connecting the movable foot-plate with the clutch mechanism and arranged to transmit the movement of the foot-plate to the same, substantially as set forth.

22. In a cycle-skate, the combination with the frame or base-plate containing the driving wheel or wheels and clutch mechanism,

and a foot-plate movable with respect thereto, of one or more pairs of driving-levers having one end journaled upon the driving-axle, one or more pivoted rods or links connecting the free ends of said levers with the movable foot-plate, and one or more flexible bands, straps or chains having one end secured to the clutch mechanism and the other end fastened to the driving-levers, substantially as set forth.

23. In a cycle-skate, the combination of a base-plate or frame, a foot-plate vertically movable independently of said frame, a clutch mechanism consisting of a friction-disk keyed to the driving-axle, a hollow projecting drum surrounding or inclosing said disk and capable of a rocking motion about the same, and friction devices carried by said drum in contact with the periphery or sides of said disk in such a manner as to grasp or bind the latter and compel it to revolve when the drum is rotated in one direction, and to loosen their hold upon the disk when the drum is rotated in the opposite direction, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 4th day of May, 1897.

ELIAS E. RIES.

Witnesses:

WM. H. CAPEL,
J. BALDENECKER.