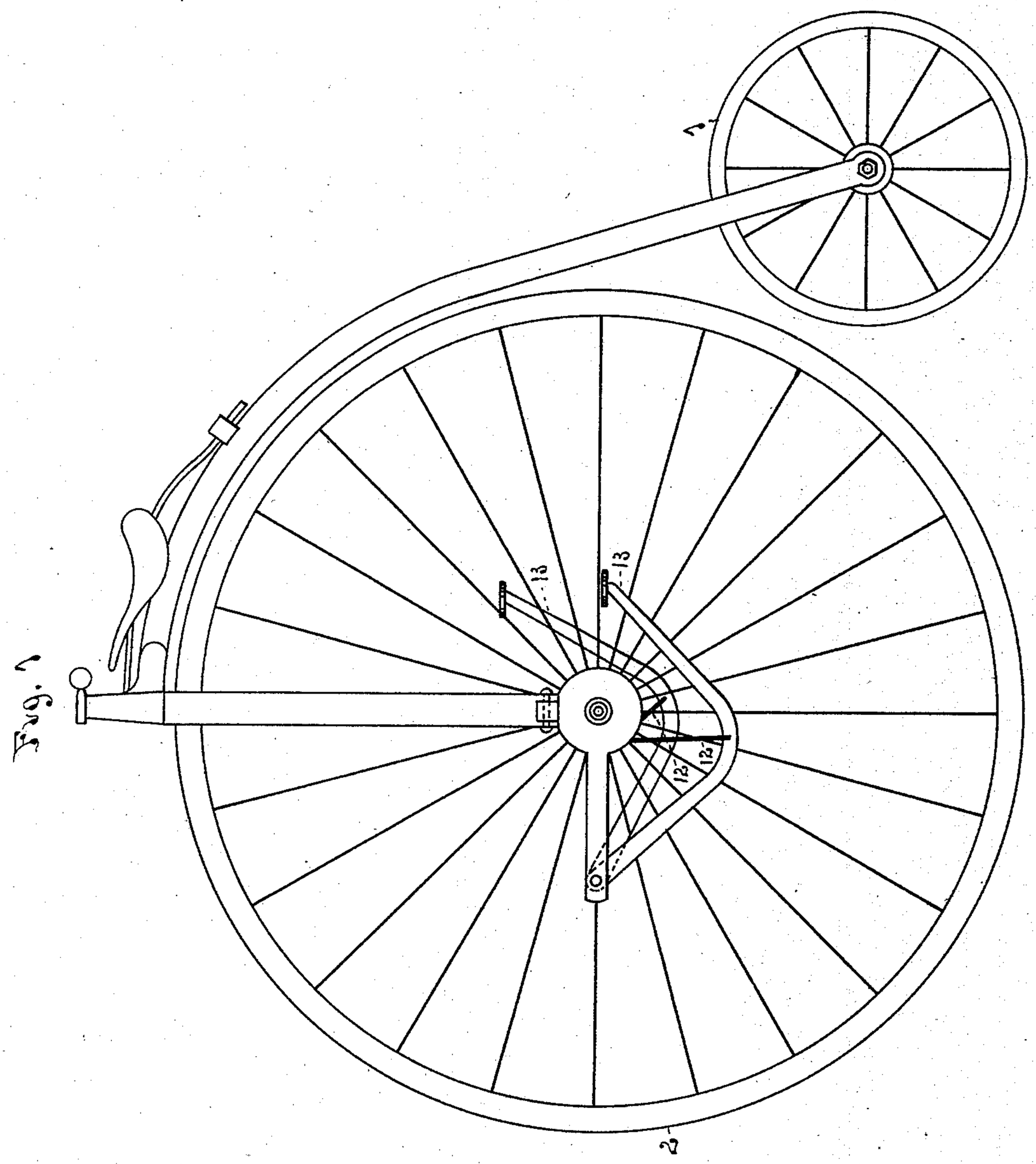
(No Model.)

2 Sheets—Sheet 1.

D. H. RICE.

VELOCIPEDE.

No. 388,446. Patented Aug. 28, 1888.



Witnesses.
Wm. S. Brown.
N. P. Ockington.

Inventor.
David Hall Rice.

(No Model.) 2 Sheets—Sheet 2.

D. H. RICE.

VELOCIPEDE.

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Fig. 2

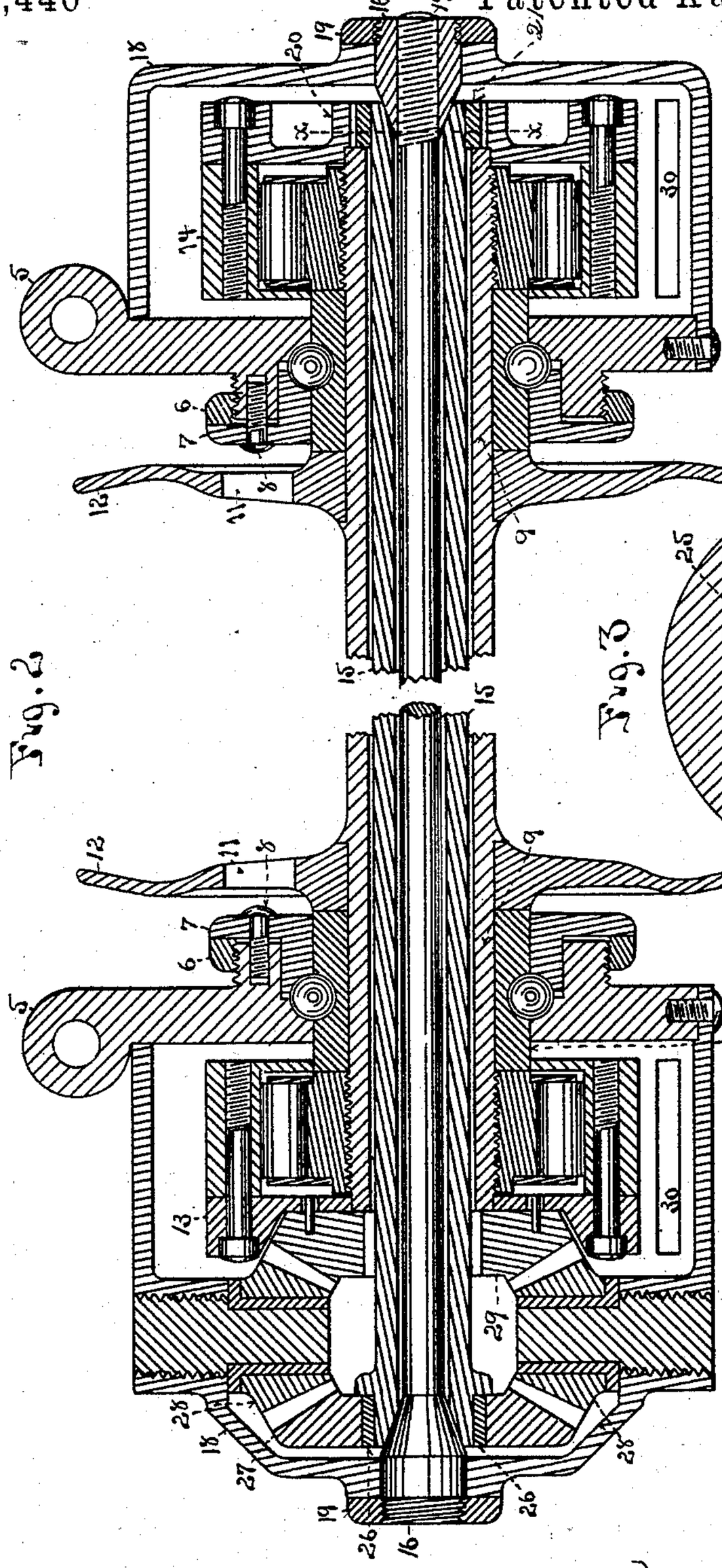
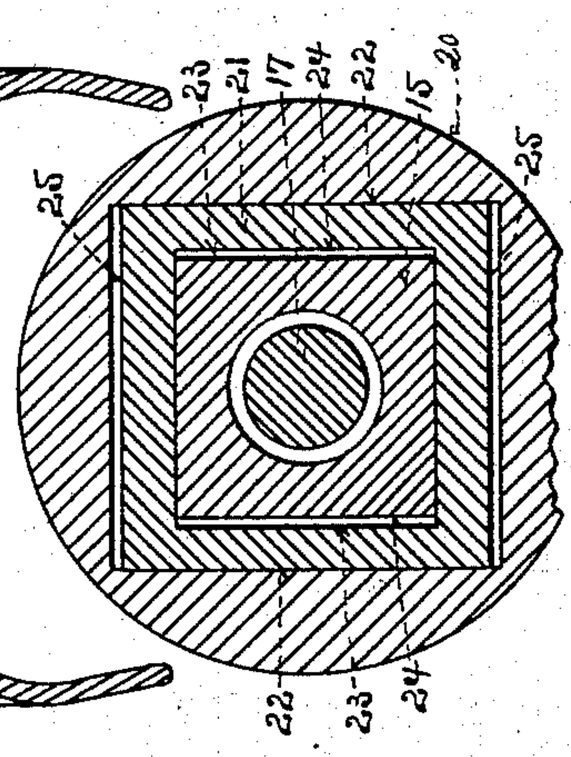


Fig. 3



Witnesses.
Wm. S. Brown.
A. P. Ockington.

Inventor.
David Hall Rice.

UNITED STATES PATENT OFFICE.

DAVID HALL RICE, OF BROOKLINE, MASSACHUSETTS.

VELOCIPEDE.

SPECIFICATION forming part of Letters Patent No. 388,446, dated August 28, 1888.

Application filed May 25, 1888. Serial No. 275,060. (No model.)

To all whom it may concern:

Be it known that I, DAVID HALL RICE, of Brookline, in the county of Norfolk and State of Massachusetts, have invented a new and useful Improvement in Velocipedes, of which the following is a specification.

My improvement relates to velocipedes, and especially to the mechanism patented to myself and Lepine H. Rice, August 24, 1886, No. 348,057; and it consists in certain new and useful constructions and combinations of the various parts of the same, substantially as hereinafter described and claimed.

In the drawings, Figure 1 is a side elevation of a velocipede containing my invention. Fig. 2 is a section longitudinally through the hub of the driving-wheel and clutch-driving mechanism. Fig. 3 is an enlarged sectional view of Fig. 2 on the dotted line *x x*.

The steering-wheel 1 is connected by its fork 2 to the backbone 3, which is supported at its other end by the small wheel 4. The steering-fork 2 is connected by pivots at its lower end to the ball-bearing disks 5 5. Each disk 5 has a tubular inward extension upon its inner face, on which is screwed the gage-ring 6. The collar 7, which is attached to the disk 5 by three or more screws, 8, forms the other member of the outer part of the ball-bearing. To extensions 9, on each end of the wheel-hub, are clamped hardened grooved sleeves 10 10, around which the balls of the bearing are placed, as shown. The whole forms the ball-bearing, substantially in principle as patented to me by Patent No. 322,482, dated July 21, 1885.

The gage-ring 6 is screwed in and out by a spanner upon its edge; but in order to get at the screws 8, I form holes 11 11 through the spoke-disks 12 12 of the hub. By means of a screw-driver reaching through hole 11, after the wheel has been turned so as to bring the hole opposite to a screw, each screw 8 may be set up to adjust collar 7 to the place allowed by the gage-ring. I am thus enabled to adjust the ball-bearing without disturbing the clutch-drum 13 or 14. The clutch-drums 13 and 14 run upon the extensions 9 9 of the wheel-hub, and it is desirable that their entire running bearing should be upon these extensions, because they then run with the wheel 1 or the reverse with the least possible friction. These clutch-drums are, however, connected together, so that one may communicate a reverse motion to the other by the tubular shaft 15, and it is desirable that this shaft shall run independently of the tubular wheel-hub, because during one-half the time it is running in the opposite direction to that of the hub. Shaft 15 is therefore supported on the conical bearings 16 16 upon the tie-rod 17, which is in turn sustained by the frame-supports 18 18, attached to disks 5 5. The tie-rod 17 is adjusted in its frame-supports and held in place by nuts 19 19. The necessary play of the ball-bearings will therefore cause the shaft 15 to bind if it be rigidly attached to either clutch-drum. To overcome this difficulty, I connect the clutch-drum 14 to the shaft 15 by the following arrangement: The cover or end of the clutch-drum is secured to its body part by long screws, as shown, and has an axial round hole in it that forms a running bearing on the extension 9 of the wheel-hub. Outward beyond this bearing a tubular portion, 20, of this drum-cover projects, the hole through it being rectangular in cross-section, as shown in Fig. 3. The end of shaft 15, which passes centrally through this rectangular hole, is also made rectangular. Between this rectangular bore of projection 20 and the rectangular exterior of the end of shaft 15 a rectangular metal sleeve, 21, is fitted. Two opposite exterior faces, 22 22, of this sleeve are fitted snugly to the corresponding parallel inner faces of the bore of hub 20, but so as to be capable of sliding therein, while the two internal faces, 23 23, of the sleeve, which are parallel to these external ones, have spaces between them and the parallel faces 24 24 of shaft 15, which lie within them. The other two external faces, 25 25, of sleeve 21 (which are at right angles to those last described) have spaces left between them and the corresponding parallel faces of the rectangular bore of hub 20, while the two internal faces of the sleeve lying parallel to these outside ones are fitted snugly but with a sliding fit to the corresponding parallel outer faces of shaft 15. It will be observed that with this construction there can be no backlash between shaft 15 and hub 20, as they reciprocally revolve each other back and forth, but that at the same time the hub has a universal adjustment

upon the shaft, because the lateral sliding capacity of the end of the shaft in sleeve 21 in one direction and the lateral sliding capacity of both the end of the shaft and the sleeve in the hub 20 in the other direction, at right angles to the first, give the clutch 14 the capacity to move on the shaft laterally in every direction while being driven by the shaft, or vice versa. At the opposite end of the shaft 15 it carries, attached to it by splines 26 26, the bevel-gear 27, which engages with the bevel-pinions 28 28, running on studs fixed in frame-support 18. Bushings of nickel bronze are fitted over the studs for these pinions to run on. To the clutch-drum 13 is attached by rivets the bevel gear 29, so as to run and be entirely free from any bearing upon shaft 15, and this bevel gear engages with the bevel-pinions 28 and completes the connection between the clutch-drums.

It will be noticed that the axes of the bevel-pinions 28 28 stand vertically to the frame of the machine, and this arrangement is advantageous, because the backlash or play between the hub of the wheel and frame is in a vertical direction when the weight of the rider is on the machine. The cogs of gear 29 on drum 13 and those of pinions 28 on the frame are therefore in the best position to allow for this movement of the one upon the other, which would not be the case so fully if the axes of the pinions were horizontal.

The clutch-drums 13 and 14 are driven by straps passing from the exterior of the drums, on which they are wound, through slots 30 30 in the frame-supports 18 18, to the pedal-levers.

What I claim as new and of my invention is—

1. The combination of wheel 1, having spoke-flange 12, with an opening, 11, through the same, and the ball-bearing on which it runs, having the part thereof on one side of the balls formed of two rings or collars embracing the balls, and secured to each other by screws 8 on the side next to said spoke-flange and in position to be brought opposite the opening therein, substantially as described.

2. The combination of the wheel-hub having extensions 9 9, and supported by bearings thereon in the machine-frame, the clutch-drums supported and revolving upon said extensions, the shaft 15, passing through the wheel-hub, supported upon a running-bearing independently of the latter, and provided with mechanism connecting it with one clutch-drum and reversing its motion with relation thereto, and a universal joint connecting said shaft to the other clutch-drum, arranged to allow said shaft to adapt itself to the variations between its running-bearing and that of the drum while being driven by the latter, substantially as described.

3. The combination of the drum 14, having the axial hole through the same provided with two opposite flat parallel faces, the sleeve 21, provided with corresponding exterior flat parallel faces, 22, fitting against the same and free to move laterally parallel thereto in the hub of the drum, and also provided with two internal flat parallel faces substantially at right angles to said external ones, and the shaft 15, provided with two flat parallel external faces fitted against the said internal ones of the hub and free to move laterally parallel thereto in the sleeve, the whole forming a universal-joint mechanism arranged to drive the shaft by the drum, or vice versa, substantially as described.

4. The combination of the wheel-hub having extensions 9 9, and supported by bearings thereon in the machine-frame, the clutch-drums supported, and revolving entirely upon said extensions, the shaft 15, passing through the wheel-hub, supported upon a running-bearing independently of the latter and connected to one clutch-drum and revolving therewith, the gear-wheel 27, attached to the other end of said shaft, the gear-wheel 29, attached to the other clutch-drum and carried by it, and the pinion 28, connecting said gear-wheels and having its axis placed vertically in the machine-frame, whereby the gear 29 is free to adjust itself thereto, substantially as described.

5. The combination of the wheel-hub having extensions 9 9, and supported by bearings thereon in the machine-frame, the clutch-drums supported and revolving entirely upon said extensions, the shaft 15, passing through the wheel-hub, supported upon a running-bearing independently of the latter and connected to one clutch-drum and revolving therewith, the gear-wheel 27, attached to the other end of said shaft, the gear-wheel 29, attached to the other clutch-drum and carried by it, and the two pinions 28 28, connecting said gear-wheels and having their axes placed vertically in the machine-frame, whereby the gear 29 is free to adjust itself thereto, substantially as described.

DAVID HALL RICE.

Witnesses:
WILLIAM P. BLAKE,
N. P. OCKINGTON.