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W. HILLMAN.

APPARATUS FOR DRILLING SPOKE HOLES IN FELLIES.

No. 457,718. Patented Aug. 11, 1891.

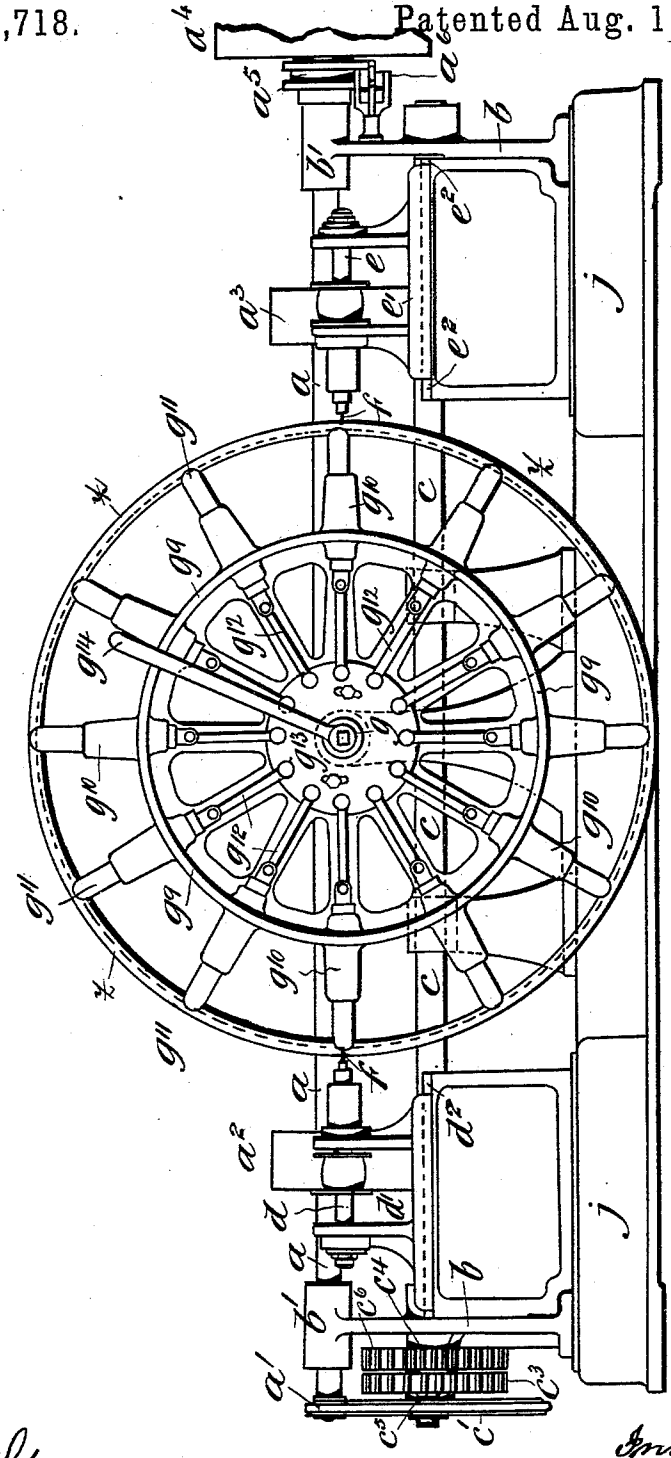


Fig. 1.

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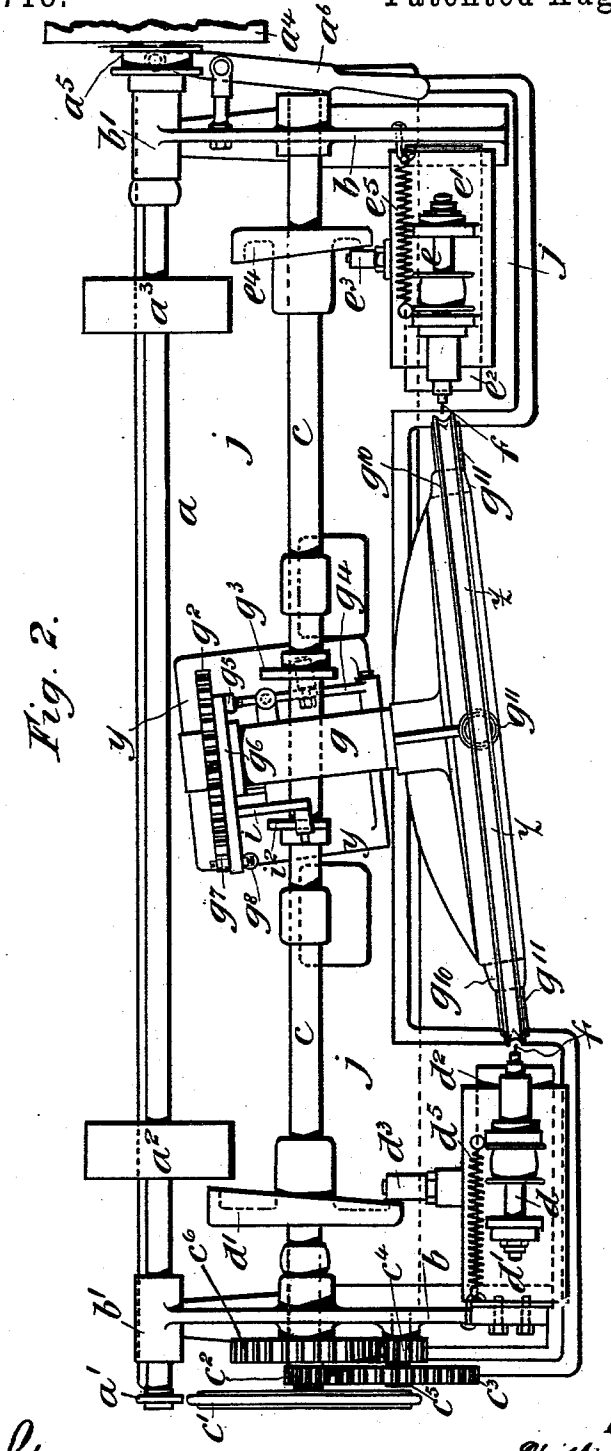


Fig. 2.

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Fig. 5.

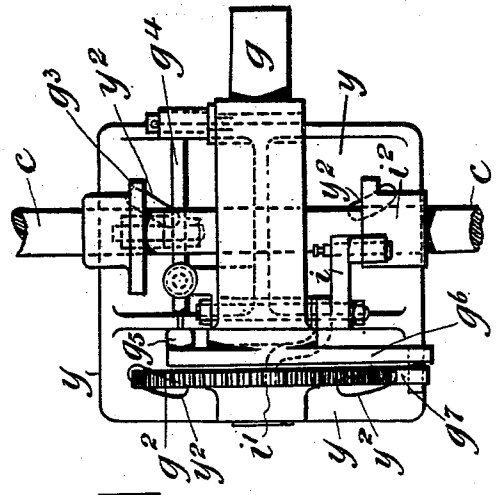


Fig. 4.

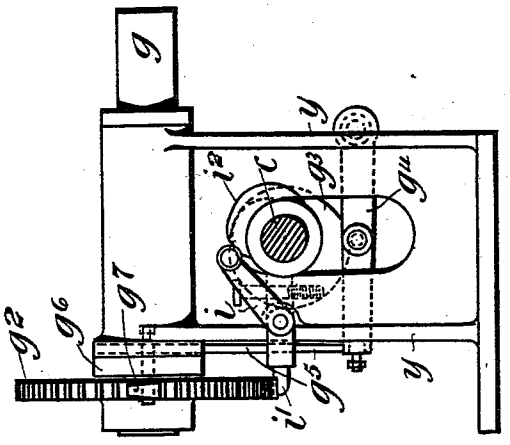
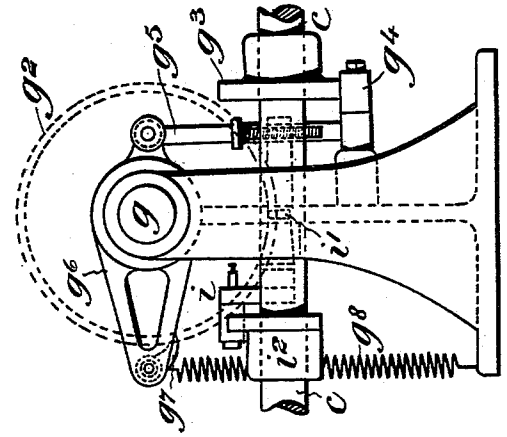


Fig. 3.



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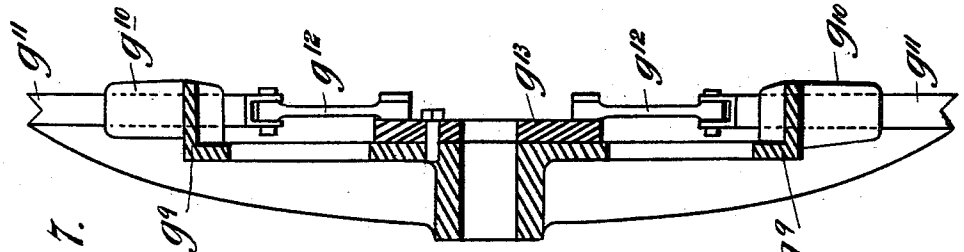


Fig. 1.

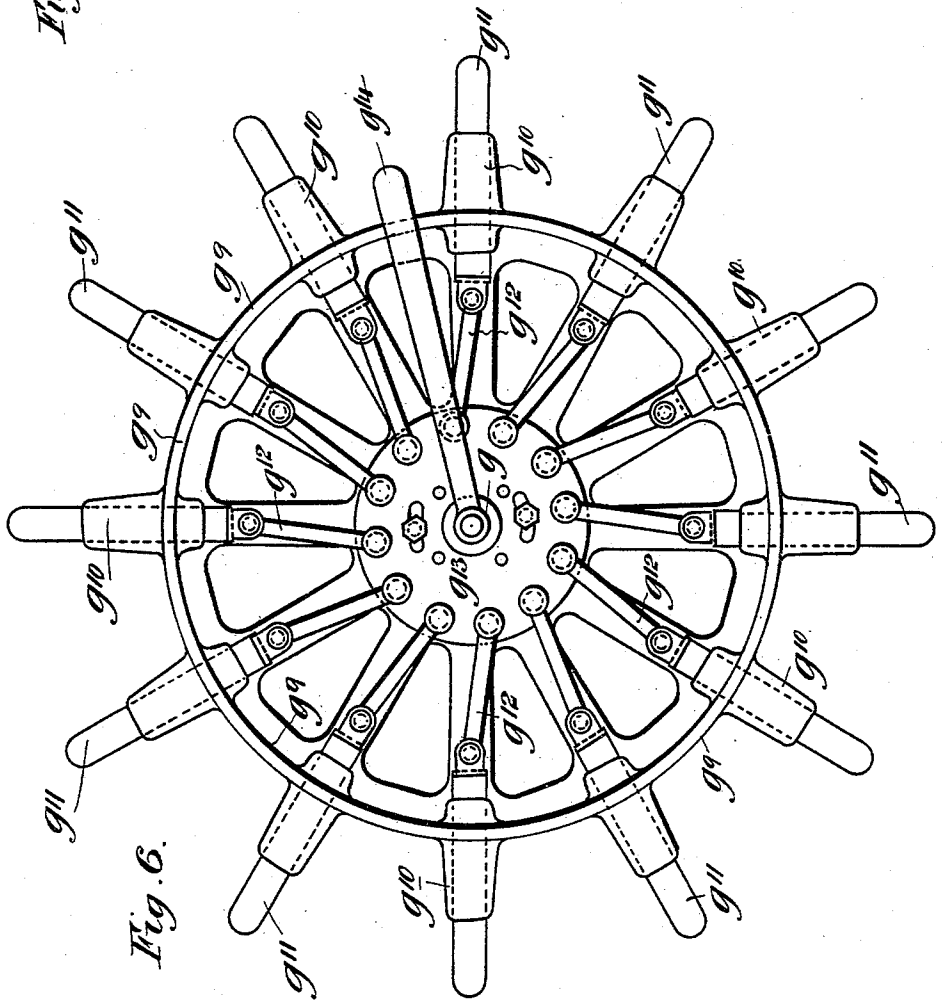


Fig. 6.

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Fig. 9.

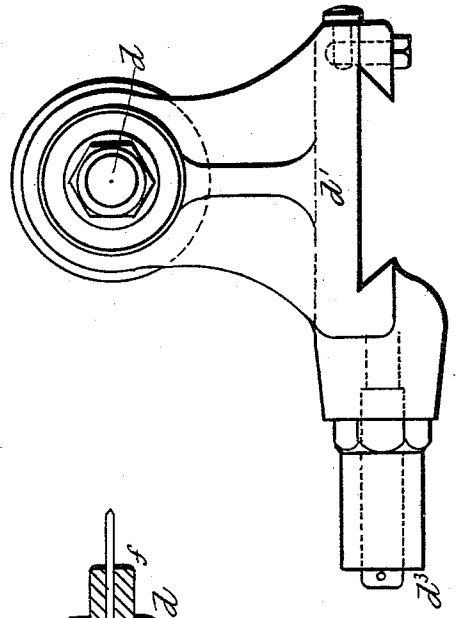
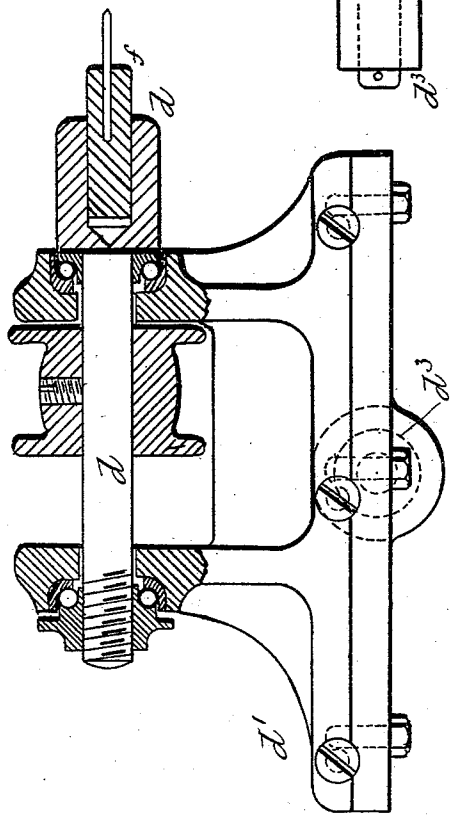


Fig. 8



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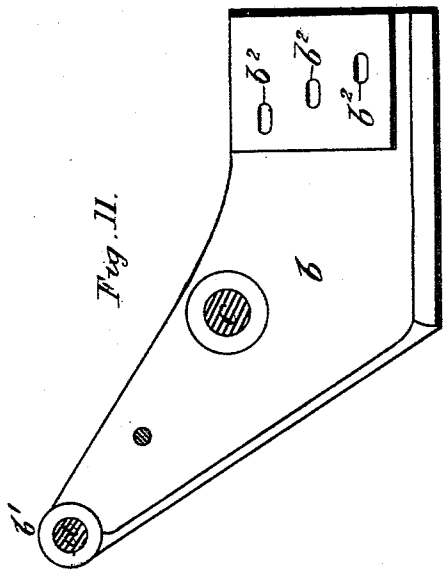
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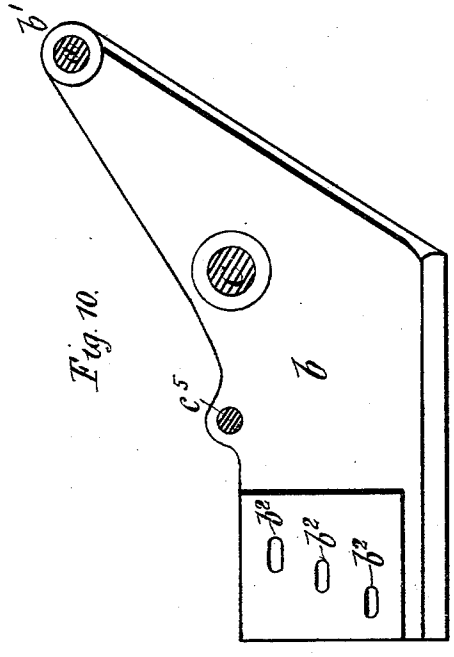
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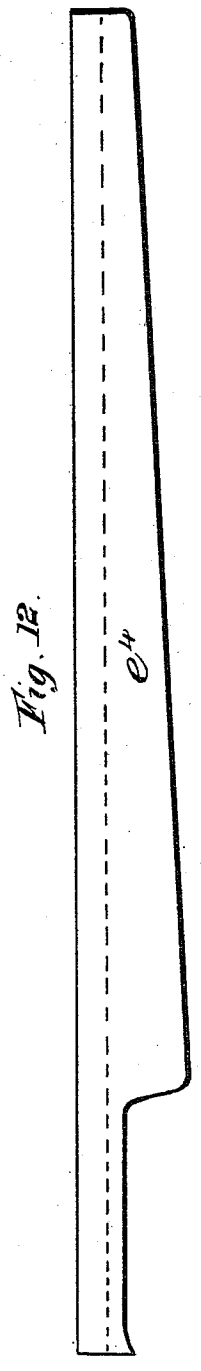
W. HILLMAN.

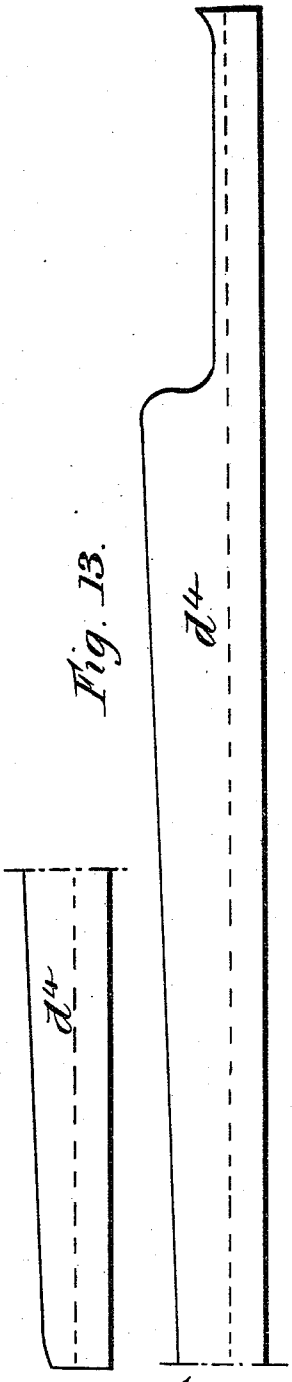
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UNITED STATES PATENT OFFICE.

WILLIAM HILLMAN, OF COVENTRY, ENGLAND.

APPARATUS FOR DRILLING SPOKE-HOLES IN FELLIES.

SPECIFICATION forming part of Letters Patent No. 457,718, dated August 11, 1891.

Application filed September 5, 1890. Serial No. 363,993. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HILLMAN, a subject of the Queen of Great Britain, residing at Coventry, in the county of Warwick, England, have invented certain new and useful Improvements in Machinery or Apparatus for Drilling Spoke-Holes in the Fellies of Velocipede and such like Wheels, of which the following is a specification, reference being had to the accompanying drawings, and to the letters marked thereon.

The invention has for its object improvements in machinery or apparatus for drilling the spoke-holes in the fellies of velocipede and such like wheels.

In the accompanying drawings, Figure 1 is a front elevation, and Fig. 2 is a plan, of a felly-drilling machine constructed according to my invention. Fig. 3 is a back elevation, Fig. 4 is a side elevation, and Fig. 5 is a plan, of the dividing apparatus used therein. Fig. 6 is a front elevation, and Fig. 7 is a section, of the felly-carrier. Fig. 8 is a sectional elevation of one of the head-stocks with its spindle carrying a drilling-tool. Fig. 9 is a back view of same. Figs. 10 and 11 are side views of brackets forming parts of frame-work, showing slots for permitting adjustment of the beds of the boring-spindle head-stocks. Fig. 12 is a development of the cam e^4, and Fig. 13 is a development of the cam d^4.

In all the figures like parts are indicated by similar letters of reference.

The machine is provided with a back driving-shaft a, which is mounted in bearings b', formed in or carried by brackets b of the framing. On one end of this shaft a is fixed a chain-wheel a', which by means of a chain gives motion to another chain-wheel c', mounted loosely on the cam-shaft c, and which by the following arrangement of gearing gives motion to said cam-shaft: The chain-wheel c' is fixed to a toothed pinion c^2, which gives motion to a toothed wheel c^3 and its connected toothed pinion c^4, mounted loosely on the fixed stud or pin c^5, and said toothed pinion c^4 gives motion to the toothed wheel c^6, fixed on the cam-shaft c. The back driving-shaft a, by means of two pulleys a^2 a^3 fixed thereon, aided by straps or bands, one of which is crossed, also gives motion to two head-stock spindles d e, carrying the drilling-tools f. The felly z is mounted and fixed on an adjustable chuck or carrier fixed at one end of a carrying-spindle g, the opposite end of which has fixed thereon a driving and holding disk g^2, which is formed with a number of openings or recesses in its periphery similar to a dividing plate, to enable the same to be rotated at the required times through a certain portion of a revolution and then to be held firmly while the drilling is effected. This step-by-step motion to the carrier-spindle g is given by means of a cam g^3 on the cam-shaft c, operating a lever g^4, which by a link g^5 operates a driving-lever g^6, provided with a pawl g^7, acting in combination with the recesses in the dividing plate or disk g^2, a spring g^8 acting upon such latter lever in the contrary direction. For convenience the parts are arranged so that the cam g^3 shall carry the driving-lever g^6 backward, and the spring g^8 shall give it the forward or feed motion; but, if desired, the reverse arrangement can be adopted. After the carrier-spindle g has been rotated, as above described, a latch consisting of a tooth i' on one end of a holding-lever i, operated by a cam i^2 on the cam-shaft c and by a spring, is caused to enter one of the openings or recesses in the dividing disk or plate g^2, and thereby securely hold it, and consequently the felly z, while the drilling is being effected. The action of the cam i^2 and spring is such that the holding-lever i is removed from the dividing disk or plate g^2 immediately before the latter is moved by the feed-lever, while directly after such feed action the holding-lever i is again caused to engage with the notched edge of the dividing plate or disk g^2.

The adjustable chuck or carrier is in the form of a wheel g^9, provided with a number of radial sockets g^{10}, fitted with sliding rods g^{11}, which at their outer ends are formed with V or other suitably shaped recesses to receive the felly z. The inner ends of these sliding rods g^{11} are by links g^{12} connected to a disk g^{13}, which is capable of rotation in relation to the carrier wheel or chuck g^9, and consequently of causing the sliding carrier-rods g^{11} to protrude a greater or less distance through the sockets g^{10} to securely hold the felly, and of

withdrawing the same to release the felly z therefrom. The said disk g^{13} is provided with a hand-lever g^{14}, by which it can be turned, and with a set screw or screws, to enable it to be readily fixed and released, as required.

To place a felly on the carrier, the sliding carrier-rods g^{11} are first drawn inward by rotating the operating-disk g^{13}. The felly is then placed around their hollowed ends. They are then slid outward until the felly fits tightly thereon, after which the disk g^{13} is securely fixed in position.

The drilling-spindles d e are mounted in sliding head-stocks d' e', separated the required distance from each other to admit the felly between them, and which are capable of movement to and fro on short beds d^2 e^2, fixed on the main bed j of the machine, with capability of adjustment thereon in a transverse direction, so as to enable the said drilling-spindles d e to be adjusted, as may be required, by means of bolts passing through the slots b^2 in the brackets b. The felly-carrier is placed at such an angle in relation to the drilling-slides or head-stocks d' e' as to cause the holes to be drilled at the required inclination, one hole being drilled on one side of the felly while another is being drilled on the opposite side thereof.

The sliding head-stocks d' e' are each fitted with a truck or roller d^3 or e^3, which is acted upon by a cam d^4 or e^4, fixed on the cam-shaft c to give the necessary forward and backward motions to the drills f, as required, for drilling the holes and for permitting the rotating of the felly z between the drilling motions. Springs d^5 e^5 are employed to keep the said trucks or rollers d^3 e^3 up to their cams.

I prefer to arrange the drilling head-stocks d' e' parallel to the driving-shaft a, and to mount the felly-carrier and driving-spindle g at such an inclination as to cause the drills f to enter the flanges of the hubs at the required angle; but, if desired, the reverse arrangement may be adopted—that is to say, the drilling head-stocks may be mounted at inclinations with the driving-shaft, and the felly-carrier and driving-spindle g may be mounted at right angles with such shaft.

The driving-pulley a^4 is loose on the shaft a, and it is fitted with friction-segments operated by a sliding clutch a^5 and lever a^6 to fix it to or release it from the shaft a in the manner now well understood.

In using the machine holes diametrically opposite are drilled simultaneously. The chuck then revolves a distance of two holes, and so on until half the holes in the felly are drilled—*i. e.*, every alternate hole—after which, without any rearrangement, the intermediate holes—those missed on the first revolution of the chuck—are drilled. This method of working is adopted when a wheel has such a number of spokes as when divided by two will yield an odd number. When, however, a wheel is required to have such a number of spokes as when divided by two will yield an even number, the following method of working is adopted: Intermediate holes around the entire circumference of the felly are first drilled at a suitable angle, and then the felly is removed from the carrier or holder and refixed thereon in reversed position to enable the remainder of the holes to be drilled at the reverse angle. If it is desired to drill the holes in the felly in a central plane, the felly holder or carrier can be fixed at right angles with the drill-spindle, and the drills fixed in a line with each other, in which case each hole can be drilled in succession at one fixing of the felly.

The machinery or apparatus herein described may be fitted with a self-acting stop mechanism of any suitable character, which when the felly has during the drilling operation been caused to make a complete revolution will stop the motion of the machine.

In my application, Serial No. 363,994, of same date herewith, I have shown and described a machine particularly adapted for drilling spoke-holes in the hubs of bicycle-wheels, and in such application I have specifically claimed the hub-carrier.

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

1. In machinery for drilling the spoke-holes in the fellies of velocipede and such like wheels, the combination and arrangement of drills acting on opposite sides of the felly, sliding head-stocks carrying such drills, cams and springs for giving to-and-fro motion to such head-stocks, a felly-carrier fitted with a dividing-plate, driving mechanism, and lever for holding and releasing the dividing-plate, and cams and springs for operating such driving mechanism and holding and releasing lever, substantially as herein shown and described.

2. In machinery for drilling the spoke-holes in the fellies of velocipede and such like wheels, the combination and arrangement of drills acting on opposite sides of the felly, with a felly-carrier adjustably fixed between such drills, and the spindle on which said carrier is mounted, the drills being arranged at different angles relative to said spindle, substantially as herein shown and described.

3. In machinery for drilling the spoke-holes in the fellies of velocipede and such like wheels, the felly-carrier consisting of a wheel fixed on the carrier-spindle, radial sockets fixed to such wheel, sliding rods working in such sockets, V or other shaped recesses at the ends of such rods to receive the felly, links connecting the inner ends of such rods to a disk, a lever fixed to such disk for partially rotating the same, and screws or bolts for fixing the disk, substantially as herein shown and described.

4. In a machine for boring spoke-holes, the combination, with a carrier for holding the article to be drilled, of two drill-spindles arranged at different angles relative to the axis of the carrier, whereby spoke-holes may be

bored simultaneously at different inclinations, substantially as set forth.

5. In a machine for boring spoke-holes, the combination, with a carrier for holding the article to be drilled and the spindle on which said carrier is mounted, of two drill-spindles arranged at different angles relative to the carrier-spindle, whereby spoke-holes may be bored simultaneously at different inclinations, and cams for reciprocating said drill-spindles, substantially as set forth.

6. In a machine for boring spoke-holes, the combination of the adjustable carrier and the longitudinally-movable transversely-adjustable drill-spindles, substantially as set forth.

7. In a machine for boring spoke-holes, the combination, with the carrier for holding the article to be drilled, of the two transversely-adjustable drill-spindles arranged at different angles relative to the axis of the carrier, whereby spoke-holes may be drilled simultaneously at different inclinations.

8. In a boring-machine, the combination, with a drill-spindle and the revoluble carrier, of a dividing-plate for rotating said carrier, a latch for locking, and means for rotating said plate, substantially as set forth.

9. In a boring-machine, the combination, with the transversely-adjustable drill-spindles, of the revoluble carrier, the dividing-plate for rotating said carrier, a latch for locking said plate in position, a pawl for rotating said plate, and cams for operating said latch and pawl, substantially as set forth.

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Witnesses:
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G. PEARSALL LOCKER.