(No Model.) 4 Sheets—Sheet 1.

A. W. McINTYRE.

MACHINE FOR GRINDING CAR WHEELS.

No. 288,717. Patented Nov. 20, 1883.

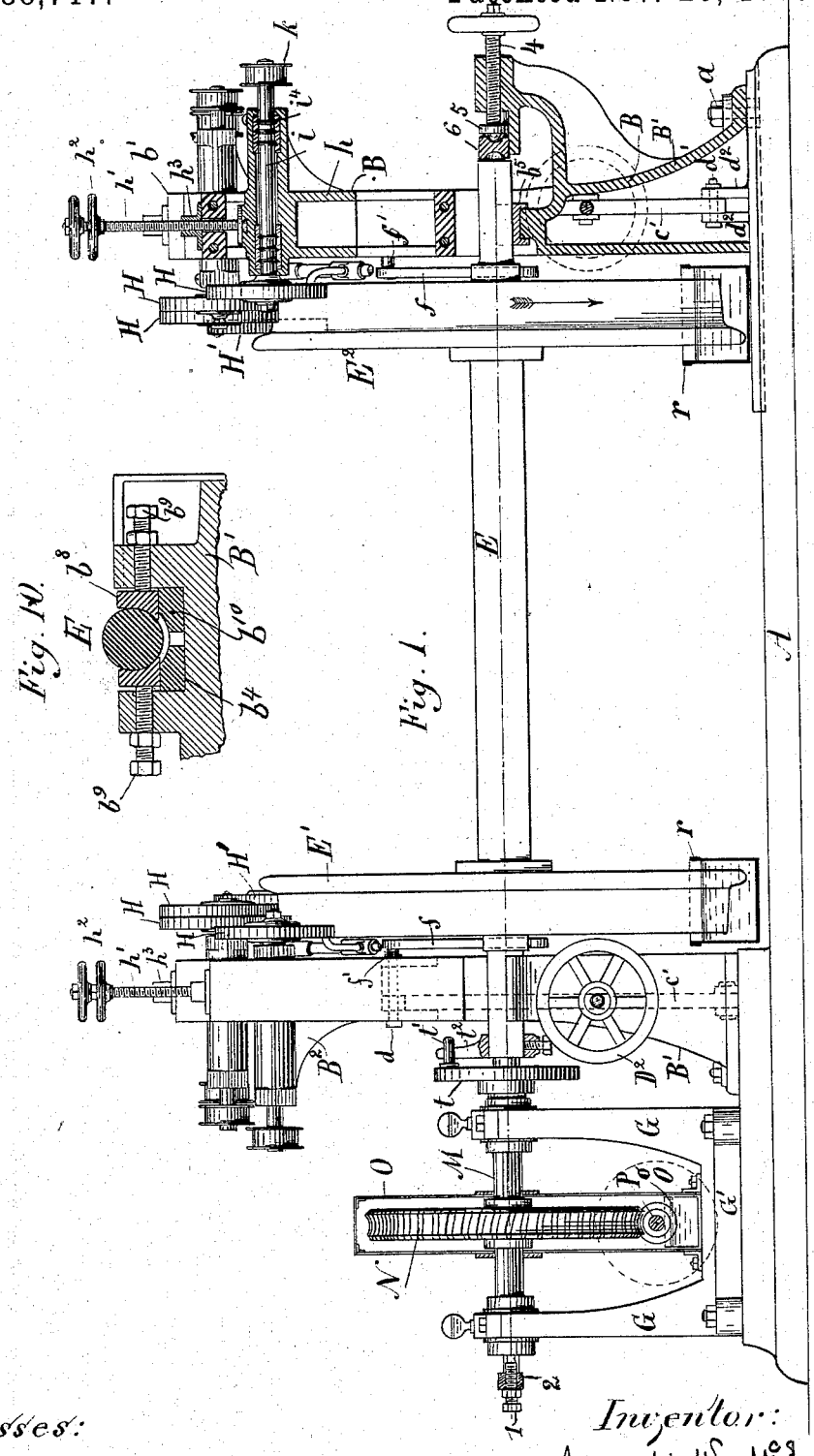


Fig. 1.

Fig. 10.

Witnesses:
Jacob Lorum.
Edward F. Norton

Inventor:
Augustus W. McIntyre
By Peirce Fisher
His Attorneys.

(No Model.) 4 Sheets—Sheet 2.

A. W. McINTYRE.

MACHINE FOR GRINDING CAR WHEELS.

No. 288,717. Patented Nov. 20, 1883.

Fig. 1.

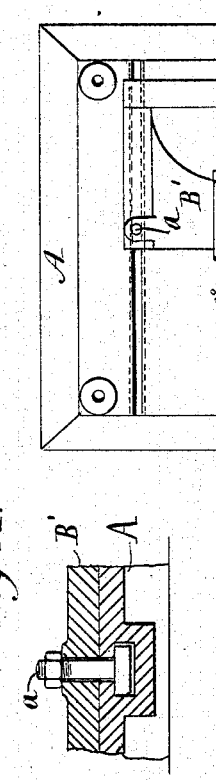
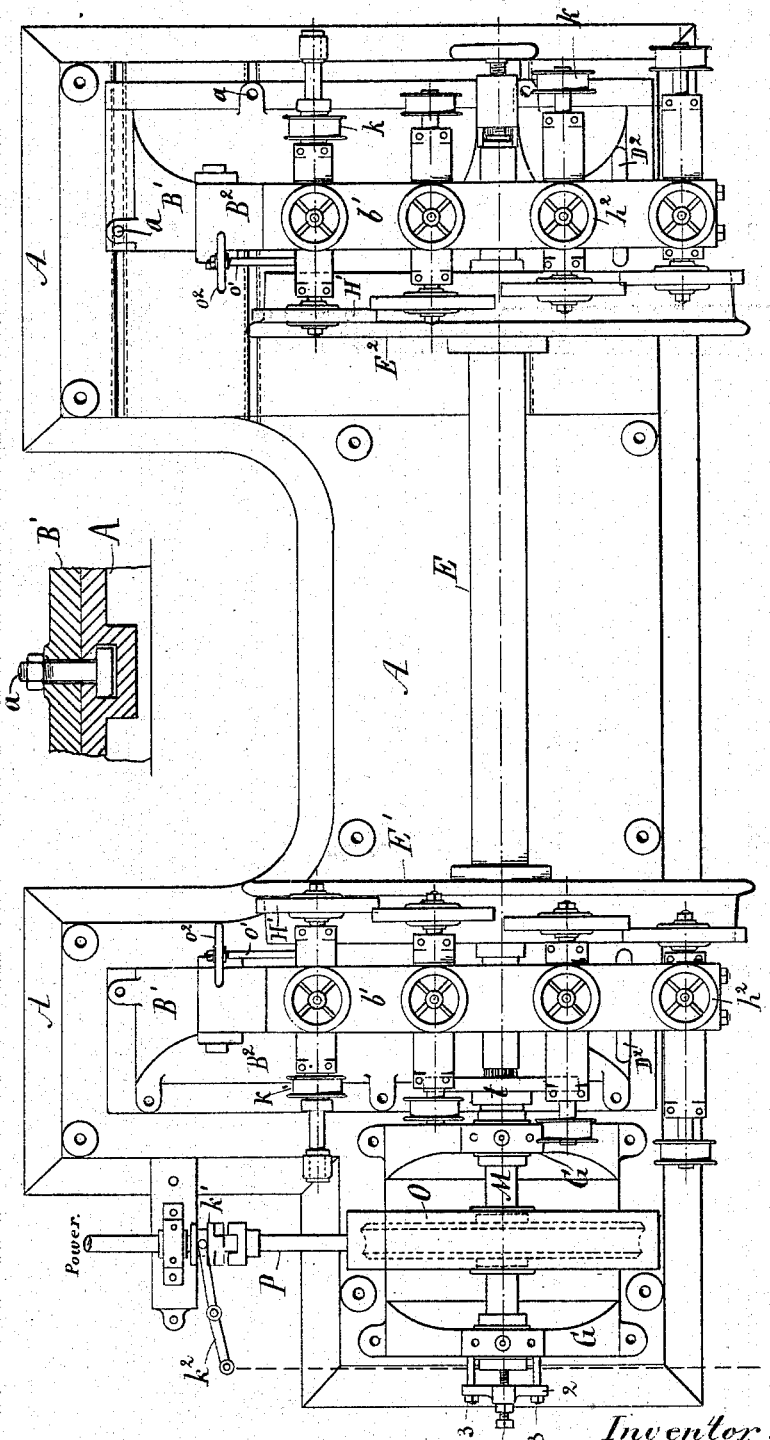


Fig. 2.



Witnesses:
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Inventor:
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His Attorneys.

(No Model.) 4 Sheets—Sheet 3.

A. W. McINTYRE.

MACHINE FOR GRINDING CAR WHEELS.

No. 288,717. Patented Nov. 20, 1883.

Fig. 3.

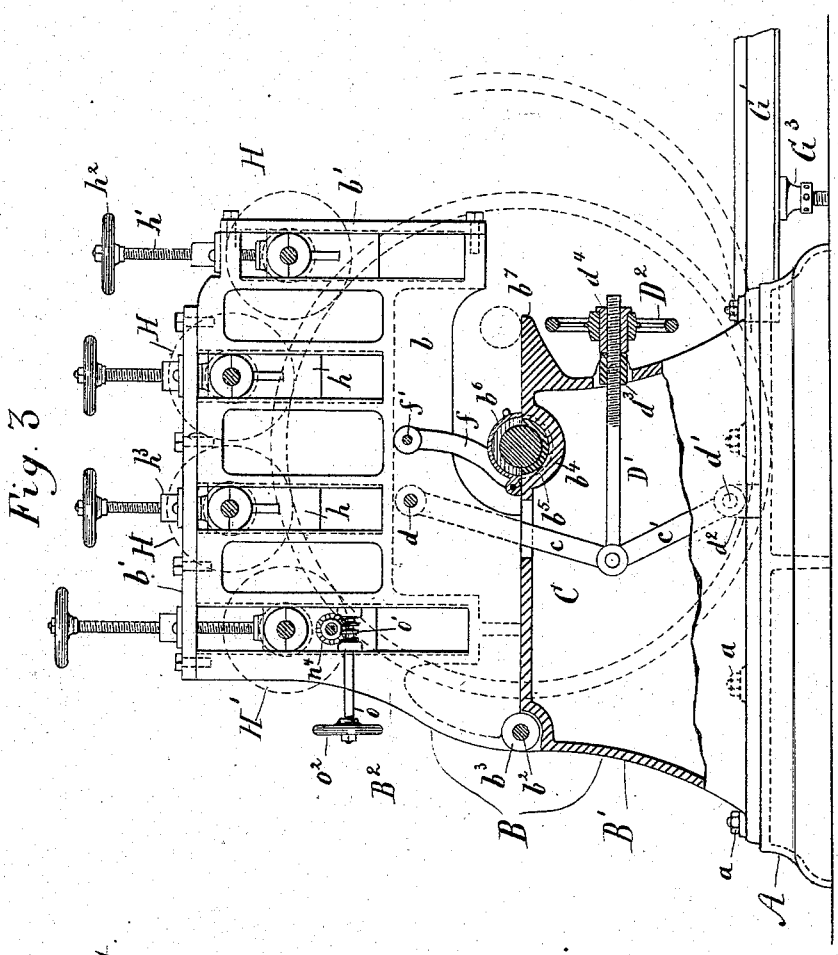


Fig. 4.

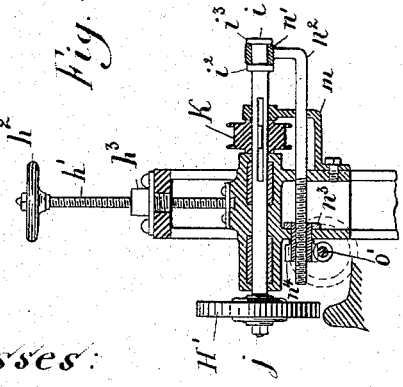
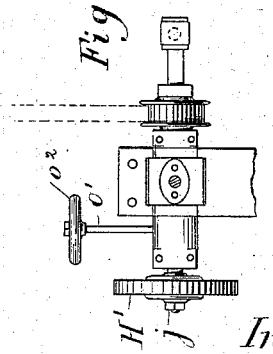


Fig. 5.



Witnesses:
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(No Model.) 4 Sheets—Sheet 4.

A. W. McINTYRE.

MACHINE FOR GRINDING CAR WHEELS.

No. 288,717. Patented Nov. 20, 1883.

Fig. 8.

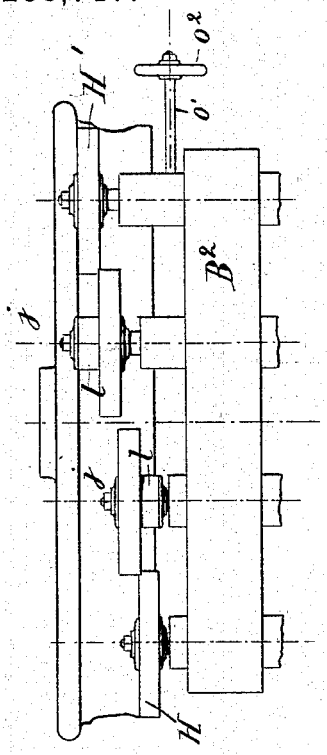


Fig. 9.

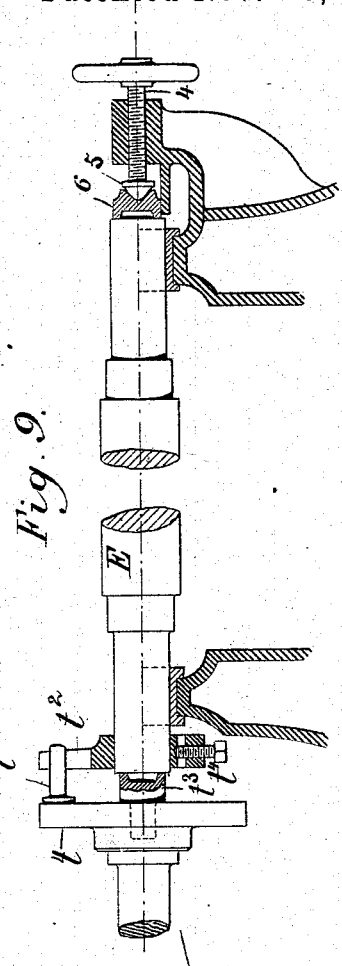


Fig. 6.

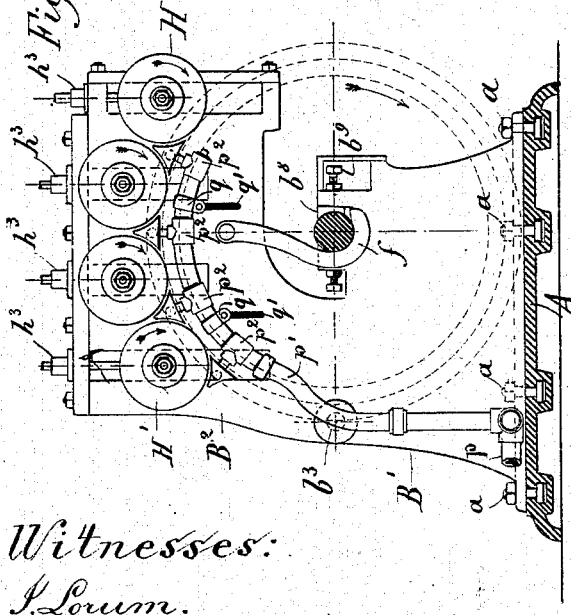
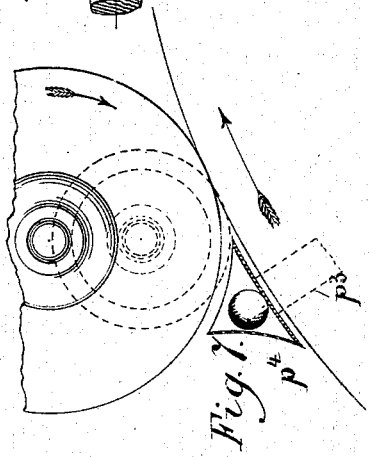


Fig. 7.



Witnesses:

I. Lorum.

Fred W Gunkle

Inventor:

Augustin W. McIntyre

By Prince Fisher

His Attorneys.

UNITED STATES PATENT OFFICE.

AUGUSTIN W. McINTYRE, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE AMERICAN CAR-WHEEL GRINDING COMPANY, OF SAME PLACE.

MACHINE FOR GRINDING CAR-WHEELS.

SPECIFICATION forming part of Letters Patent No. 288,717, dated November 20, 1883.

Application filed June 9, 1882. Renewed May 19, 1883. (No model.)

To all whom it may concern:

Be it known that I, AUGUSTIN W. McINTYRE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Grinding Car-Wheels; and I do hereby declare the following to be a full, clear, and exact description of the same, sufficient to enable those skilled in the art to which said invention appertains to make, construct, compound, and use the said invention or improvements, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation, partly in section, of the improved machine. Fig. 2 is a plan view of the same. Fig. 3 is a view in elevation from the inner side of one of the standards, the base thereof being in part broken away and shown in section. To avoid obscurity the car-wheel and abrading-wheels are left in dotted lines, and the exhaust mechanism, Fig. 6, entirely removed. Fig. 4 is a sectional view, and Fig. 5 a view in plan, of the grinding-wheel and its journal-box next in contact with the flange of the car-wheels. Fig. 6 is a view in elevation from the inner side of one of the standards, the base whereof is in part section, and is designed to show the exhaust mechanism for withdrawal of fine dust of abrasion. The car-wheel is left in dotted lines, to allow for view of other parts. Fig. 7 is a detail view, showing one of the grinding-wheels in contact with the rim or tread of the car-wheel, and the trumpet-like coupling of the exhaust mechanism singular to said wheel. Fig. 8 is a view in plan of the series of grinding-wheels in contact with the defective tread of a car-wheel. Fig. 9 is a view in elevation, partly sectional, of the journal-bearings of the car-wheel axle, showing, also, a portion of the mechanism to rotate said axle. Fig. 10 is a detail view in cross-section of the adjustable journal-blocks to sustain the car-wheel axle. Fig. 11 is a detail view in cross-section of the T-groove in the bed-plate, and the bolt and nut to adjust the movable standard therein.

Cast-iron car-wheels having a "chilled" rim or tread frequently develop imperfections or soft spots upon the surface of the tread after more or less usage, which imperfections make the tread to wear unevenly, so that some portions thereof become flattened or irregular, and the perimeter of the wheel is no longer true or concentric with repect to the axle upon which it is mounted. The tread being untrue, the wheel ceases to run smoothly upon the rail; but, on the contrary, whenever the defects or irregularities exist, the wheel in its revolution tends to pound the rail, and this, after a little while, to such a destructive extent that the wheel must needs be replaced, oftentimes long before the "life" of the wheel, as determined by the depth of the "chill," is at an end. Although it is highly desirable to save the discarded wheel for future use by truing the tread, so that the wheel may be made effective to the full depth of the chilled portion of the rim, such is the hardness of the tread that it has been found better economy in general to neglect the wheel entirely than to attempt by any of the ordinary tools or methods to restore it to an even running condition. Heretofore effort has been made, however, to remove the irregularities in surface of the tread of the wheel, as before described, by use of a machine resembling the ordinary metal-turning lathe, upon the centers of the head and tail stocks of which the ends of the car-wheel axle were sustained, the defective wheels remaining rigidly on said axle the same as when in readiness for use upon the road. The axle being thus centered in the lathe was slowly revolved thereon, and necessarily the car-wheels with it, whereupon the treads of these latter were each borne upon by a rotating wheel, of emery or like abrading composition, set in a traversing tool-carrier or slide-rest usual to said lathes, which said grinding-wheels were applied to and fro across the surface of the tread until the blemishes had been removed and the wheel was again trued around its entire perimeter. If succeeding sets of wheels chance to differ, as when of broad, narrow, regular, or of some intermediate gage, or when of greater or lesser diameter than the preceding, or even when uniform therewith, it is manifest that inasmuch as this whole weight of the suspended axle and of the wheels thereon is sustained by the centers of the head and tail stocks of the lathe,

much time and care must be expended, both in mounting and dismounting the work and in maintaining it in nice adjustment upon this lathe. By just so much this economy and running capacity of the machine are lessened. Again, there is but a single abrading-wheel to each of the car-wheel treads to be reduced, and as the thickness of said abrading-wheel must be in practice less than the width of the tread, so that no risk of destruction or of overheating be incurred, it follows that said wheel must be applied back and forth transversely of the tread, consuming much more time than if abrasion were proceeding over the entire width of the tread at once; nor is said grinding-wheel adapted to reduce imperfections of the flange or to keep the same of like depth as originally—a precaution of importance when treating the wheels of city tramways.

My invention has for its object to remove irregularities of surfaces from treads of car-wheels, whether new or old, so that said treads shall be of true disk throughout, and accurately concentric with the axle upon which they are mounted, to which end my invention consists of certain new and useful improvements in machines for grinding car-wheel treads, substantially as hereinafter set forth, and distinctly defined in claims.

As shown in the drawings, a heavy bed or base plate, A, extends entirely under the machine and serves to sustain the several working parts. Two upright standards, B B, placed parallel to each other and at distance apart approximately equal to the length of an ordinary car-wheel axle, are firmly secured to the bed-plate A by suitable bolts and nuts, *a a'*, in manner well understood.

Each upright standard B is composed of a lower fixed portion or base section, B', and of an upper movable part or section, B^2, which latter consists of side plates, *b b*, and end and top plates, *b' b'*, securely bolted or otherwise joined together, so as to form a skeleton-like frame or shell of substantially rectangular shape. The side plates, *b b*, have large rectangular openings formed in them, which, as said plates are set exactly opposite and parallel, allow for the play of the journal-boxes of the abrading wheels or grinders set therein, in manner hereinafter described.

The base section, B', and the upper section, B^2, are hinged together at the back of the standard by pin-bolt, b^2, which passes through perforated ears or lugs b^3, formed in the side plates, *b b*, and in the base section, B', or in other convenient manner. The movement of the upper section, B^2, to and from the base section, B', of the standard, around the hinge or pivot-pin b^2 as an axis, is regulated by the toggle-lever C, the two arms or members *c c'* of which are jointed at their remote ends, the first to a pin-bolt, *d*, passing transversely through the shell of the upper section, B^2, and the second to a bolt, *d'*, passing through projecting lugs d^2, formed on the interior of the hollow casing or base section, B', of the standard. The upper arm, *c*, of the toggle, depending within the upper section, B^2, of the standard, enters the base section, B', through a long slit or slot in the upper face thereof, and is jointed at its end to the adjacent end of the other arm, *c'*, and of the screw-rod D, which said rod passes through a perforated block or bearing, d^3, that is pivotally mounted in an opening in the front of the base section, B', and bears upon its outer end a threaded sleeve or nut, d^4, to which the hand-wheel D^2 is keyed. By this arrangement of toggle-lever C and operating-rod D the upper section, B^2, may be quickly raised from or lowered to the base section, B', of the standard, as desired—that is to say, upon turning the hand-wheel D^2, and in consequence the nut d^4, keyed thereto, the screw-thread of the latter engages the like thread of rod D, withdrawing or advancing it, as the case may be, from or into the interior of base section, B', and straightening or bending the toggle-link accordingly, thereby lifting or lowering the upper section, B^2.

It is to be noted that as the bearing d^3 is pivoted it allows for the composite motion of the rod D and toggle-joint, due to the separate centers *d* and *d'* of the swinging arms *c c'*.

At exactly opposite points in the upper faces of the base sections, B', of the standards are cylindric cavities b^4, which seat the flanged bases of the bearing blocks or boxes b^5, Figs. 1, 3, and 9, upon which boxes rest and rotate the journals of the car-wheel axle E. There may be a series of said replaceable boxes differing from each other in internal diameter, to adapt the same to differences in diameter or curvature of the various journals; but in lieu of this the boxes may be made as shown in Fig. 10, in which event the cavities b^4 of the base sections, B', will have upon their interior the curved section-pieces b^8, which by screw-rods b^9 and jam-nuts may be adjusted to snugly fit the curve of the car-wheel journal, so as to insure perfect evenness of revolution. A perforated plate, b^{10}, at base of cavity b^4 traps the flying dust, &c., so as to avoid the danger of cutting the face of the journal. A cover, b^6, hinged to the base section, B', of the standard, and packed with felt saturated with paraffine or the like, fits down over the journal of the car-wheel axle when in position and lubricates the same.

From the inner face of the hinged section B^2 of the standards there depends a swinging hook, *f*, which is pivoted at *f'* to the side plate, *b*, of the said section, and, as the car-wheel axle E is in position upon the boxes b^5, rests with its angularly-bent end beneath said axle. When the swinging section B^2 of the standard is lifted upon its axis b^2 by operation of the toggle-lever C, the hook *f* rises therewith and unships the journals of the car-wheel axle E from the bearings b^5, so that each journal rolls forward onto the extended lip b^7 of the base section, B', until the wheels E' E^2, mounted on said axle E, meet the rails G' G^2, when the set may be quickly and easily re-

moved and another as readily returned for grinding, a screw-jack, G^3, under each of the rails allowing for perpendicular adjustment of same with respect to the extended lips b' of the base section, B′, to accommodate sets of wheels of different diameters, as the case may be.

The rectangular openings in the upper or hinged sections, B^2, of the standards are fitted with the journal-boxes h of a series of abrading-wheels or grinders, H H′, said boxes being free to move up and down in the vertical ways to which they are fitted, and are adjusted therein, at any point desired, by means of the screw-threaded rods h', which said rods are swivel-jointed at one end to the boxes h, and intermediate of the hand-wheels h^2 at the other end of said rods. These engage with screw-threaded bushings h^3, that are secured to the top plate of the casing B^2. It is manifest that as each grinder of the series is mounted in a journal-box wholly disconnected from the other, each of said wheels may be accurately adapted to the curve of the car-wheel in process of being ground without in the least disturbing the adjustment of the remaining grinders of the set. The grinders are made from any desired abrading composition, and may have their cutting-faces sloped to conform to the cone or incline in surface of the car-wheel tread, if preferred.

The grinding-wheels have the usual hub or core perforated to receive and set upon the end of the axles i, and the said wheels are held thereon by set-nut j or other convenient means, while the axles i bear near their opposite ends the pulleys k, around which pass the drive-belts to suitable line-pulleys and shafting, whereby the grinding-wheels are revolved.

It is of importance that each axle i (except that bearing the wheel H′, as hereinafter described) should have transverse rings or ribs formed thereon, which take into corresponding grooves in the lining-plates of the journal-boxes h, as shown at i^4, and so prevent all lateral or endwise movement of said axles in their bearings.

In general, the grinding-wheels H H′ are arranged in such relation that transversely of the car-wheel each of said grinders occupies its own appropriate space, so that no two of said grinders are to be found working over the same portion of the surface of the tread. Sometimes, however, the irregularities in the tread are such that it is of advantage to have two of the grinders operating upon the same field or space, to which end the central wheels, H H, have loose rings $l\,l$ set upon the axles with said wheels, which, by removing the end nuts, $j\,j$, may be taken from the axles and returned again upon the side of said wheels opposite to what is shown in drawings, Fig. 8, whereby the wheels will be shifted in position and placed in alignment with the end wheels, H H′, of the set. Moreover, the back wheel, H′, has an additional function to perform, in particular where car-wheels of city tramways or the like are being treated, which is to accurately reduce the flange of the rim, so that it shall be of the same height above the tread as before, and the continuity of surface between tread and flange be preserved. To this end said abrading-wheel H′, Figs. 4 and 5, has a side arm or bracket, m, bolted to its journal-box h, the upper end of which bracket is perforated to admit the passage of the axle i.

Between the bracket m and the sides of the box h, and upon the axle i, is mounted the pulley k, said pulley and axle being fitted with a feather-and-spline or like joint, to allow for lateral movement of the axle in its box h and through the pulley without affecting the speed of rotation of the grinder H′. To accomplish this lateral movement or shift of the axle i, said axle has two raised bosses, $i^2\,i^3$, near its end, between which loosely rests the collar n' of a bent rod, n^2, which said rod passes through perforations in the bracket k and box h, and has a screw-thread at its end to engage with like thread in the bushing n^3, that is fitted to the side plate of the journal top h. The bushing n^3 is free to revolve, and has upon its end a pinion-wheel, n^4, which engages with a worm, o', of a set-rod, o, having a hand-wheel, o^2, at its end, and sustained in projecting lugs of the sliding box h. If, now, the hand-wheel o^2 be rotated, the worm-gear $o'\,n^4$ causes the bushing n^3 to rotate, and this in turn, through its threaded connection with rod n^2, advances or retracts said rod, together with the axle i, transversely through the box h, whereby the grinder H′ may be shifted to any part of the flange of the car-wheel at the same time that the other hand of the operator is free to govern the downward movement of said grinder H′ by the hand-wheel h^2.

To remove the flying dust of abrasion from the vicinity of the workman, there is provided an exhaust-pipe, p, connected with any suitable fan, (not shown,) to which pipe there is joined a flexible section, p', of rubber or like composition, and beyond this a series of slightly-curved short coupling-pieces, p^2, each of which has a branch pipe, p^3, terminating in a curved trumpet-like mouth, p^4, that is open on the side next against the grinding-wheel. The flexible section p' allows the sustaining-collars q, and with them the coupling-pieces p^2, which they encompass, to be readily adjusted in the slots q', cut in the faces of the inner side plate, b, of the standard B^2, so as to conform in height to the diameter of the car-wheel being ground, and also allows the hinged section B^2 to be freely moved to and from the base section, B′, of the standard without disarrangement or disconnection of any of the parts. Telescopic joints on the two center branch pipes, p^3, permit the adjustment of said pipes, and, in consequence, of the trumpet-mouth p^4 thereof, to and fro across the head in keeping with the shift in position of the center wheels, H H, as hereinbefore described.

As shown in Fig. 7, the grinding-wheel, in wearing away, descends in vertical line to-

ward the tread of the car-wheel, and does not interfere with the position of the trumpet-mouth p^4 of the exhaust-pipe. To still further reduce the dust, but more particularly the temperature of the car-wheel, a water-pan, *r*, is provided, which constantly submerges the rim of the wheel as the same rotates.

From a base plate, G′, which is firmly bolted to the bed-plate A of the machine, rise two upright posts, G G, which at their upper ends afford bearings for the arbor or mandrel M, said mandrel intermediate of the posts having a worm-wheel, N, secured thereto and inclosed within a tight casing, O, which latter is secured to the base plate, G′. A worm on the end of shaft P meshes with the wheel N, said worm being in part submerged in the oil-box *o*, located at the bottom of the casing O. A clutch, *k′*, on the shaft P may be shifted through the medium of lever k^2 and by suitable connection from the front of the machine, so that the revolution of the worm-gear, and, in consequence, of the mandrel M, may be readily and quickly controlled. The mandrel M has the usual face-plate, *t*, and projecting pins *t′*, which latter is to engage with the carrier t^2, attached to the end of the car-wheel axle in the well-known way, and at the end opposite the face-plate the mandrel is borne upon by screw-rod 1, passing through cross-head 2, which is sustained upon rods 3 3, projecting from the post G, whereby to firmly brace the mandrel against end thrust or play. A spindle, t^3, tightly socketed in the end of mandrel M, expands at its front into a head, t^4, concave-faced to receive the end of the car-wheel axle, which latter is free to revolve therein, and yet be maintained true and firmly against end-thrust.

At the tail end of the machine a screw-rod, 4, passes through an arm projecting from the base section, B′, which said rod has an expanded end, 5, to fit into a socket in a block, 6, that has a concave face to encompass the end of the car-wheel axle, the block being supported by a rest from the projecting arm of the base B′. When the car-wheels and axle are in position in the machine, said axle rests at its journals wholly upon the boxes b^5 of the standards B, the entire weight being thereby sustained. The screw-rod 4 is then advanced until the ends of the axles are forced snugly home within the concave faces of the head t^4 and of the block 6, and so tightly held against any end-play or displacement such as would tend to make the revolution of wheels and axle irregular. If the axle be of such length as not to be clamped within limited play or compass of the screw-rod 4, the standard B, to which said rod is attached, may be moved along in the grooved T-ways of bed-plate A, Figs. 1, 2, and 11, to any desired point, and then rebolted, thus accommodating the machine to any size of axle—broad or narrow gage, as the case may be. To insure ease of movement of standard B upon the bed-plate, it is advisable to make the bolts *a* of conical head, so that they will not bind in the T-grooves. (See Fig. 11.) The sectional plates or brasses within the journal-boxes b^5 being adjusted to conform exactly to the curvature of the axle-journals, the clutch *k′* is shifted, causing the worm-gear, the mandrel, and the car-wheels and axle to revolve at speed suitable for grinding. Section B^2 of standard is then lowered by means of toggles C, bringing the abrading-wheels H H′ in contact with the tread of the car-wheel, each individual wheel or grinder being capable of independent adjustment in the ways of section B^2, so as to secure uniformity or variation of cutting action, as desired. When the calipers show the truing of the rim of the car-wheel to be completed, a single turn of hand-wheel D^2 causes the toggle C to raise the section B^2 and the grinders away from the face or tread of the car-wheel, and on unshipping the clutch *k′* the work may be rapidly dismounted to make way for the next set of wheels.

Although the invention has been described as of particular value in treatment of cast-iron car-wheels, which develop imperfections in surface of tread after more or less usage, it is by no means confined in practical operation to any one class or condition of wheel. New wheels, as well as old, may be easily reduced to true disk by operation of the machine, and these, whether made wholly of cast metal or when provided with shrunk wrought tire, as in case of locomotive "drivers," paper car-wheels, and the like. In every instance, if the wheels be set upon an axle, they may be advantageously worked in this machine. Good results may be attained from its use, whether the grinding-wheels revolve in same direction with or contrary to that of the car-wheel set, and I contemplate the use of the machine under both conditions; nor if the tire or tread of the car-wheel be unusually broad or narrow—the latter in case of the wheels of city tramways—is it necessary to have four grinding-wheels to the set. The number of these must depend upon the character of the work the machine is required to do.

It is obvious that many modifications of the details of the machine may be made without departing from the spirit of the invention, which is not restricted to the precise construction herein shown and described. Thus the section B^2 may move to and from the base section, B′, of the standard in vertical ways, instead of being hinged thereto, and may be moved by a screw-rod arranged to engage therewith, instead of by use of the toggle mechanism, which is the preferred form herein set forth. Any of the usual forms of sectional pillow-block may be adapted to the cavities of base section, B′, to sustain the journals of the car-wheel axle, and, if desired, other wheels than the flange-grinder H′ may have their axles to shift transversely of the tread. These and like obvious changes in structure are deemed to be within the scope of the invention and the intent of the claims hereinafter specified.

Having thus described the invention, what

I claim as new, and desire to secure by Letters Patent, is—

1. A machine for grinding car-wheels, having standards upon which the axle of a set of car-wheels may rest and rotate, substantially as described.

2. In machines for grinding car-wheels, the combination, with the base section of a standard upon which the axle of a car-wheel set may rest and rotate, of a movable section of said standard carrying the grinding or abrading mechanism proper, substantially as described.

3. In machines for grinding car-wheels, the combination, with the base section, B′, of the hinged section B^2 of the standard, and the toggle-lever C, substantially as set forth.

4. In machines for grinding car-wheels, the combination, with the base section and movable section of the standards B, of the swinging hook *f*, substantially as described.

5. In machines for grinding car-wheels, the combination, with the base section of a standard having an extended lip to sustain the axle of the car-wheel set, of a set of rails adjustable with respect thereto, substantially as described.

6. In machines for grinding car-wheels, the combination, with the base section to sustain the car-wheel axle, of a movable section of a standard having a series of grinding-wheels adjustable therein, substantially as described.

7. In machines for grinding car-wheels, the combination, with the movable section of the standard, of a series of grinding-wheels, one of which, together with its axle, is laterally adjustable, substantially as described.

8. In machines for grinding car-wheels, the combination, with the movable section of the standard, of a grinding-wheel, its axle, and a pulley mounted thereon, a shifting rod, and mechanism, substantially as set forth, to move the same laterally, substantially as described.

9. In machines for grinding car-wheels, the combination, with the movable section of a standard provided with a series of grinding-wheels, of a dust-exhaust mechanism adapted to the wheels of the series, and having a flexible connection with the main exhaust-pipe, substantially as described.

10. In machines for grinding car-wheels, the combination, with a series of adjustable grinding-wheels, of a dust-exhaust mechanism having means, substantially as described, to adjust the same with relation to the wheels, substantially as described.

11. The combination, with the revolving mandrel M, of the spindles t^3, the base sections of the standards upon which rests the car-wheel axle, the adjusting-rod 4, and the block 6, substantially as described.

12. The combination, with the standard upon which a car-wheel axle may rest and rotate, of a series of abrading-wheels mounted in the standard, out of alignment one with the other, and in conformity to the curvature of the car-wheel, substantially as described.

13. The combination, with the standard upon which a car-wheel axle may rest and rotate, of a series of grinding-wheels adjustable in said standard, substantially as described.

14. The combination, with the standard, of a series of grinding-wheels adjustable therein, and of a dust-exhaust mechanism, which latter consists of a main pipe, a flexible section thereof, a series of short coupling-pieces having branch pipes with trumpet-like mouths, one or more of said branch pipes being telescopically jointed, and of encircling-collars and set-nuts, whereby to sustain the exhaust mechanism, as desired, in suitable slots in the standard, all substantially as described.

15. The combination, with the standard upon which a car-axle may rest and rotate, of abrading mechanism adjustable in said standard, substantially as described.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, this 6th day of June, A. D. 1882.

AUGUSTIN W. McINTYRE.

Witnesses:
EDWARD F. GORTON,
FRED W. GUNKLE.