

(No Model.)

2 Sheets—Sheet 1.

H. C. SMITH.

MACHINE FOR GRINDING LINKS AND LINK BLOCKS FOR VALVE
MOTIONS OF LOCOMOTIVES.

No. 507,639.

Patented Oct. 31, 1893.

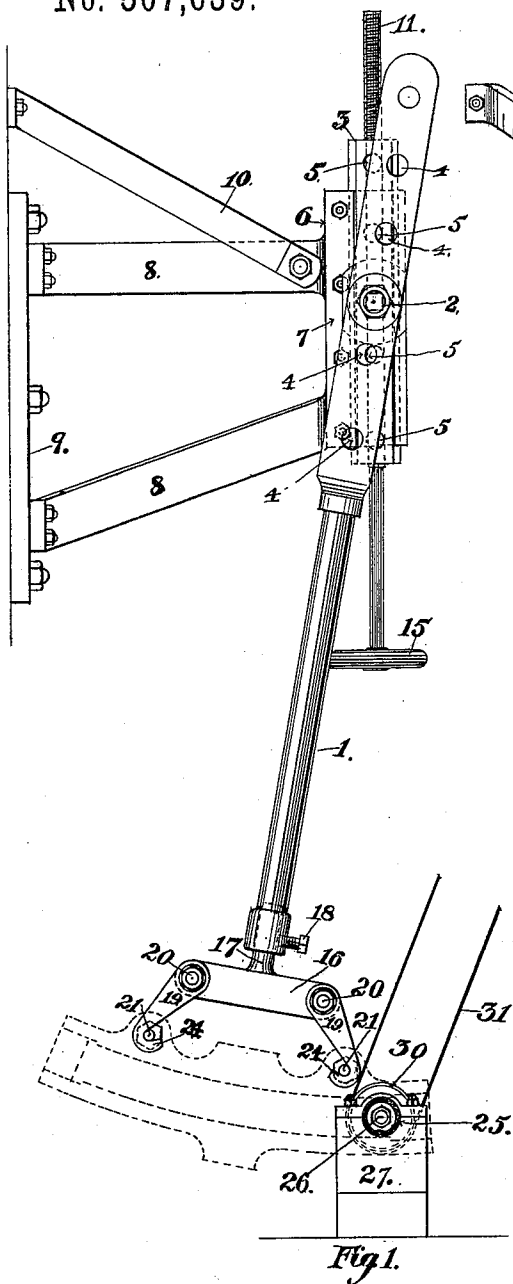


Fig. 1.

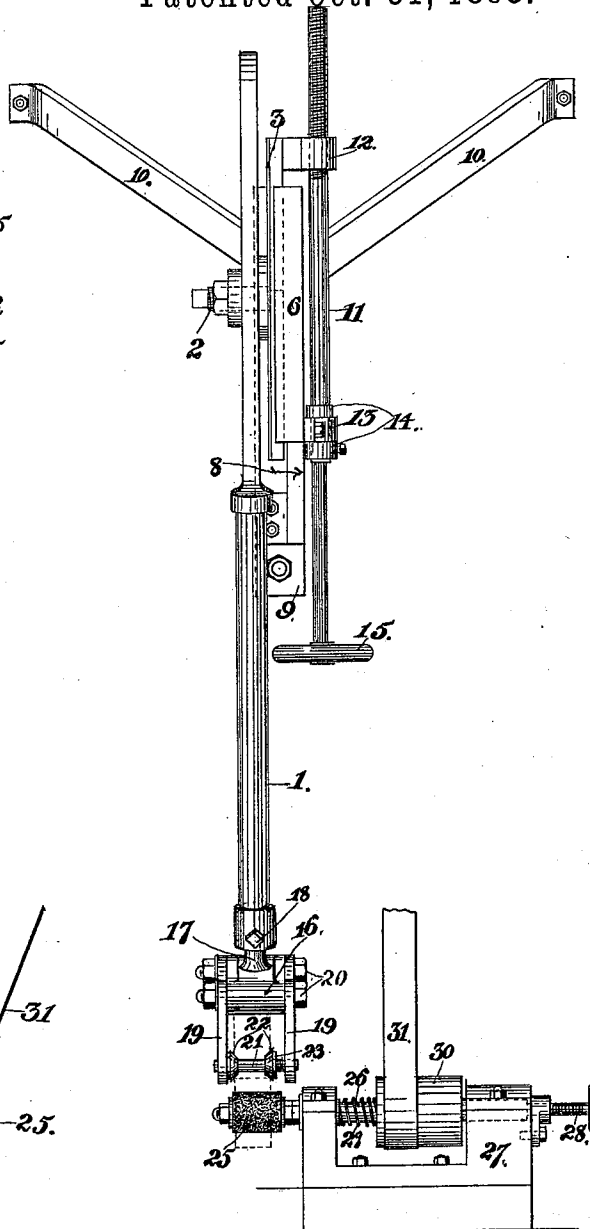


Fig. 2.

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Inventor:

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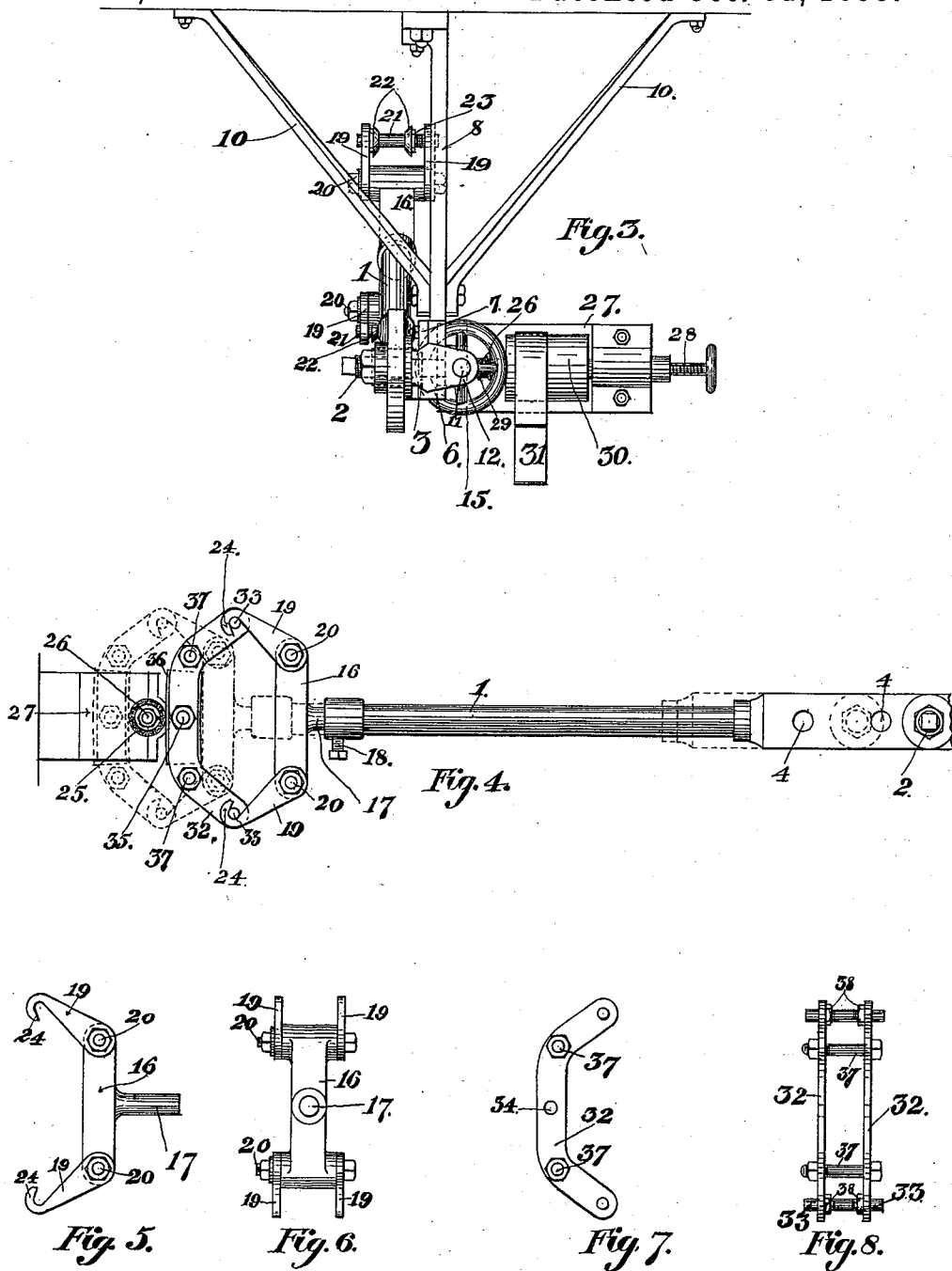
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2 Sheets—Sheet 2.

H. C. SMITH.
MACHINE FOR GRINDING LINKS AND LINK BLOCKS FOR VALVE
MOTIONS OF LOCOMOTIVES.

No. 507,639.

Patented Oct. 31, 1893.



Witnesses:

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UNITED STATES PATENT OFFICE.

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MACHINE FOR GRINDING LINKS AND LINK-BLOCKS FOR VALVE-MOTIONS OF LOCOMOTIVES.

SPECIFICATION forming part of Letters Patent No. 507,639, dated October 31, 1893.

Application filed April 3, 1893; Serial No. 468,900. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. SMITH, of Oneonta, in the county of Otsego and State of New York, have invented new and useful Improvements in Machines for Grinding the Links for the Valve-Motions of Locomotive Engines and the Link-Blocks Therefor, of which the following is a specification:

It is well known that the links and blocks for the valve-motions of locomotive engines are required to be case hardened, or otherwise tempered, in order to obtain the necessary endurance of the parts, and that the process of hardening or tempering the parts involves the heating of them to a degree that is liable to twist and warp them out of shape so as to render them practically useless, without subjecting them to manipulations that involve much labor and expense, with only an approximation to perfection of the fitting of the parts.

The object of my invention is to provide facilities for grinding tempered links and blocks to perfectly corresponding curves, so that the block will slide in the slot of the link without permitting any appreciable lost motion therein. This object I attain by the mechanism illustrated in the accompanying drawings, which are herein referred to and form part of this specification.

In said drawings Figure 1 is a side elevation of my machine arranged to grind a link for a valve-motion, said link being indicated by dotted lines. Fig. 2 is a front elevation of the same. Fig. 3 is a plan view. Fig. 4 is a side elevation of the lower portion of a pendulous arm of my machine arranged for holding the link-blocks during the operation of grinding the convex side of the same. Figs. 5 and 6 are details of chuck for holding either links or blocks during the operation of grinding; and Figs. 7 and 8 are detached details for attaching to said chuck, for the purpose of adapting it to hold the link-blocks during the operation of grinding them.

As represented in the drawings, 1 indicates a pendulous arm, or radius bar, which is arranged to swing on a shiftable stud or pivot, 2, which is fitted to engage in either one of the holes, 4, formed in the upper portion of said arm; said upper portion being preferably made flat to facilitate the attachment of said bar to

the pivot 2; the lower portion of said bar is usually made tubular for a purpose hereinafter explained; by means of the holes 4 the pendulous arm can be arranged to suit links and blocks which are required to have their arcs formed to different curvatures. The pivot 2 can be secured into either one of a series of holes, 5, that is best suited to the work to be done. Said holes are formed in an adjustable slide, 3, which is fitted to move vertically in a guide, 6, provided with a gib, 7, that is adjustable to take up any wear of either the slide or guide. The guide 6 forms part of the bracket, 8, secured to a wall-plate, 9, and supported by braces, 10, but when my machine is to be placed in position remote from the wall of a building, the guide 6 can be arranged and held in position by any suitable means.

The slide 3 is provided with a screw-tapped lug, 12, in which a feeding-screw, 11, is fitted to engage for the purpose of moving said slide upwardly or downwardly as occasion may require. The feeding-screw 11 is journaled in a box, 13, and is provided with collars, 14, which will prevent said feeding-screw from shifting from its position in respect to the guide 6. The feeding-screw 11 is provided with a hand-wheel, 15, for the purpose of imparting a rotatory motion to said feeding-screw.

To the lower end of the pendulous arm 1 there is a chuck, or head, 16, adjustably attached thereto, so as to afford facilities for altering the length of said pendulous arm in respect to the pivot 2, thereby affording the means for changing the distance between said pivot and the center line of the link, or link-block, more or less than the distance between two of the holes 4, when occasion so requires; said chuck is provided with a stem, 17, which fits into the bore of the tubular portion of the arm 11. A set-screw, 18, or other suitable means, is provided for the purpose of securing said chuck in place on the arm 11.

The chuck 16 is preferably made in the form of a T-shaped head, having binding-bolts, 20, at its opposite ends; said binding-bolts being provided for the purpose of securing a pair of adjustable-hooks, 19, at opposite sides of each end of the chuck; said hooks are arranged to engage with the ends

of a pair of mandrels, 21, which pass through the holes formed in the link to receive the joint-pins of the eccentric-rods which, in the engine, are connected to the link of the valve-motion. In order to centralize said mandrels in the holes formed in the links to receive said joint-pins, each of said mandrels is provided with a pair of conical-collars, 22, one of which should be fixed and the other adjustable. A nut, 23, is arranged to bear against the adjustable conical-collar so as to force the same toward the fixed conical-collar and thereby centralize the mandrel to which said collars are attached in the joint-pin hole to which a mandrel is appropriated. Each of the adjustable-hooks 19 has, at its lower end, an open hook or bend, 24, that is fitted to engage on the corresponding end of a mandrel 21 which projects beyond the outer face of the hook 19 at each side of the chuck 16; to secure a valve-motion link in place on said chuck, the mandrels 21 are first secured in place in the holes formed in the link for the joint-pins for the eccentric-rods; the link is then placed in the chuck 16 by inserting the protruding ends of the mandrels 21 into the bends of the corresponding hooks 19, said hooks being adjusted to bring the center of the link into correspondence with the center line of pendulous arm 1. When this is accomplished the nuts of the binding-bolts 20 are screwed up snugly and the link will be immovably fastened in the chuck ready for the operation of grinding.

The securing of the link in the chuck 16 can be effected before the pendulous arm 1 is fixed in place on the pivot 2, and the length of said arm can then be more perfectly adjusted to a required radius. Directly under the center of pivot 2, and at the required distance below the latter, there is arranged an abrasive-wheel, 25, of emery or other similar material, which is secured to a shaft, 26, fitted to revolve in a pillow-block, 27. An adjusting-screw, 28, is arranged to bear against the end of the shaft 26, to force the latter in one direction, and a spring, 29, coiled around said shaft, will press the latter in a reversed direction. A pulley, 30, is secured to the shaft 26, and a driving-belt, 31, that receives its motion from a driving-pulley of the usual character (not shown in the drawings) imparts the required rotatory motion to the abrasive wheel 25.

For the purpose of adapting my machine for grinding a hardened link-block, 36, to the required curvatures for fitting into the slot of a link, I provide an attachment to the chuck 16, as shown in Fig. 4; said attachment consists of a pair of bent side-bars, 32, which will carry the link-block 36 to sufficient distance below the head of the chuck to allow the abrasive-wheel 25 ample space to rotate in the open space between said head and the link-block when the latter is secured to the attachment of the chuck. A bolt-hole, 34, is formed midway between the

extremities of said side-bars, for the purpose of receiving a clamping-bolt which will pass through the wrist-pin hole of the link-block. Additional clamping-bolts, 37, pass through both of the side-bars 32, near the ends of the link-block 36, for the purpose of holding said link-block securely between said side-bars. Stay-bolts or mandrels, 33, are fixed between the side-bars 32, near each extremity of the latter, for the purpose of keeping said side-bars at a proper distance apart at all times; each of said stay-bolts is provided with nuts, 38, that can be adjusted at the proper distance apart to maintain the side-bars in position to allow a link-block to be inserted between them; after which the center-bolt—through the bolt-hole 34—and the clamping-bolts 37 can be screwed up to secure the link-block in place; each of the stay-bolts 33 is made sufficiently long to allow their opposite ends to protrude from the outer sides of the side-bars 32, and said protruding ends are fitted to engage in the bends 24, of the hooks 19, in precisely the same manner that the mandrels 21 do in securing a link to the chuck 16 as hereinbefore described.

It should be understood that when a link and block are to be ground to fit each other, their curvatures must have corresponding radiuses, the common radius being the center line of each and the length of said radius being determined by measuring from said center lines to the center of the pivot 2. The diameter of the abrasive-wheel 25 being equal to the width of the slot in the link will grind out said slot to its required size when the pendulous arm 1 is swung back-and-forth on the pivot 2. In grinding the link-block 36, the chuck 16 is adjusted in the lower end of the pendulous arm, by sliding the stem 17 inwardly or outwardly, as occasion may require, in the tubular portion of said arc. When properly adjusted for one of the curved faces of said link-block, either the convex or concave side, the pendulous arm 1 is swung on the pivot 2 until the side to be operated upon is ground to its proper curvature, after which the chuck is again adjusted in the pendulous arm to suit the opposite side of the link-block; when this is accomplished, the pendulous arm is swung to permit the abrasive-wheel to grind the unfinished side of the link-block so that the latter will move freely in the slot of the link.

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

1. A machine for grinding links and link-blocks for valve-motions, consisting of a pendulous-arm which is adjustable to different radiuses and provided with a chuck adapted to hold either a link or a link-block, and an abrasive-wheel arranged to grind out the slot of said link or the curved sides of said link-block; said abrasive-wheel being arranged to the pivot of said pendulous-arm in such relation that a true curve can be obtained in said link or link-block to the arc of any circle of

which the pivot is the center, as and for the purpose herein specified.

2. An adjustable chuck for a machine for grinding valve-motion links, consisting of a head provided with adjustable arms fitted to engage with projecting studs inserted in the holes for the joint-pins in said link, and binding-bolts for securing said arms in immovable positions, as and for the purpose herein specified.

3. An adjustable chuck for holding link-blocks in a grinding machine, consisting of a

head provided with arms fitted to engage with bolts in the opposite ends of the side-bars of said chuck; said side-bars being arranged to clamp a link-block between them, and stay-bolts which afford the means for securing said side-bars to the chuck, as and for the purpose herein specified.

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