(No Model.) G. H. CORLISS, Dec'd. 3 Sheets—Sheet 1.

E. A. CORLISS, Administratrix.

MACHINE FOR BORING THE VALVE BOXES OF CYLINDERS OF STEAM ENGINES.

No. 450,402. Patented Apr. 14, 1891.

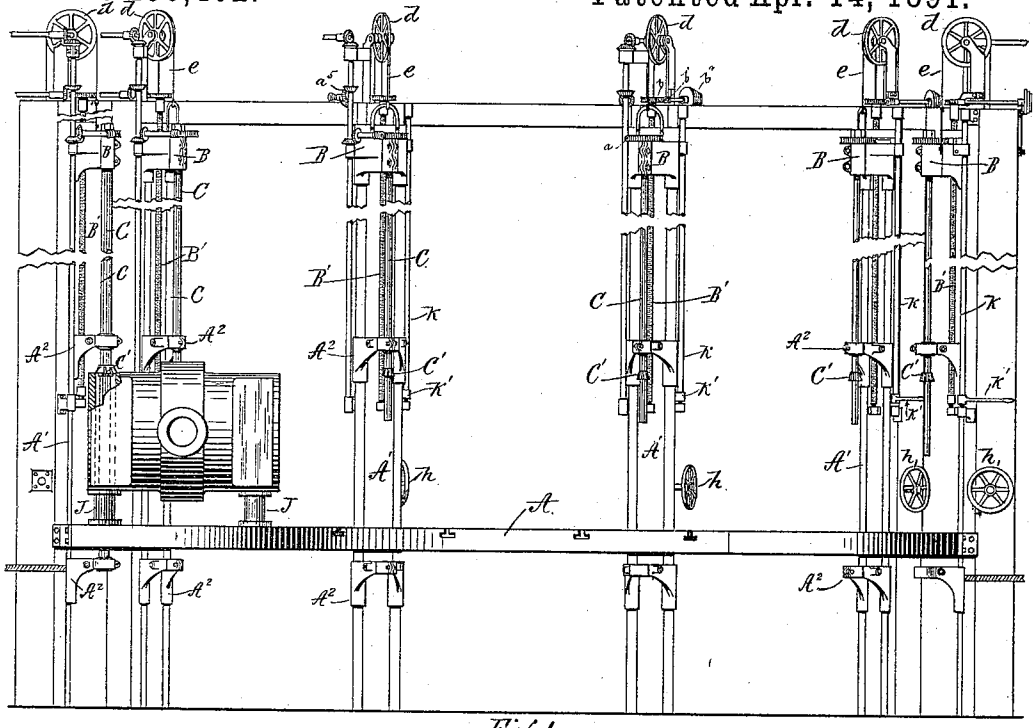


Fig. 1

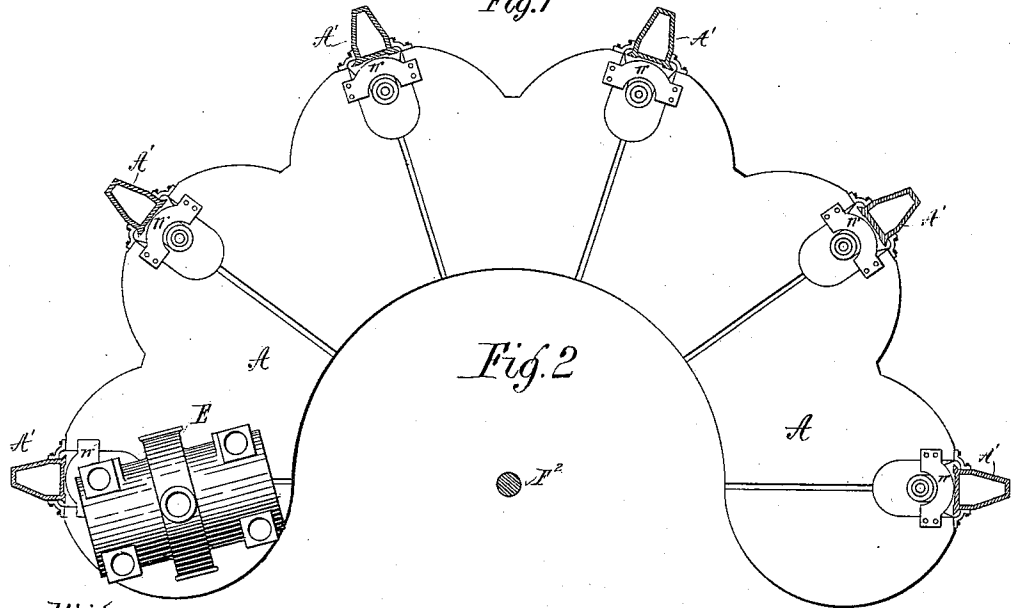


Fig. 2

Witnesses:
Henry Marsh Jr.
Maria L. Corliss

Inventor.
Emily A. Corliss,
Administratrix of the Estate of
George H. Corliss.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) G. H. CORLISS, Dec'd. 3 Sheets—Sheet 2.

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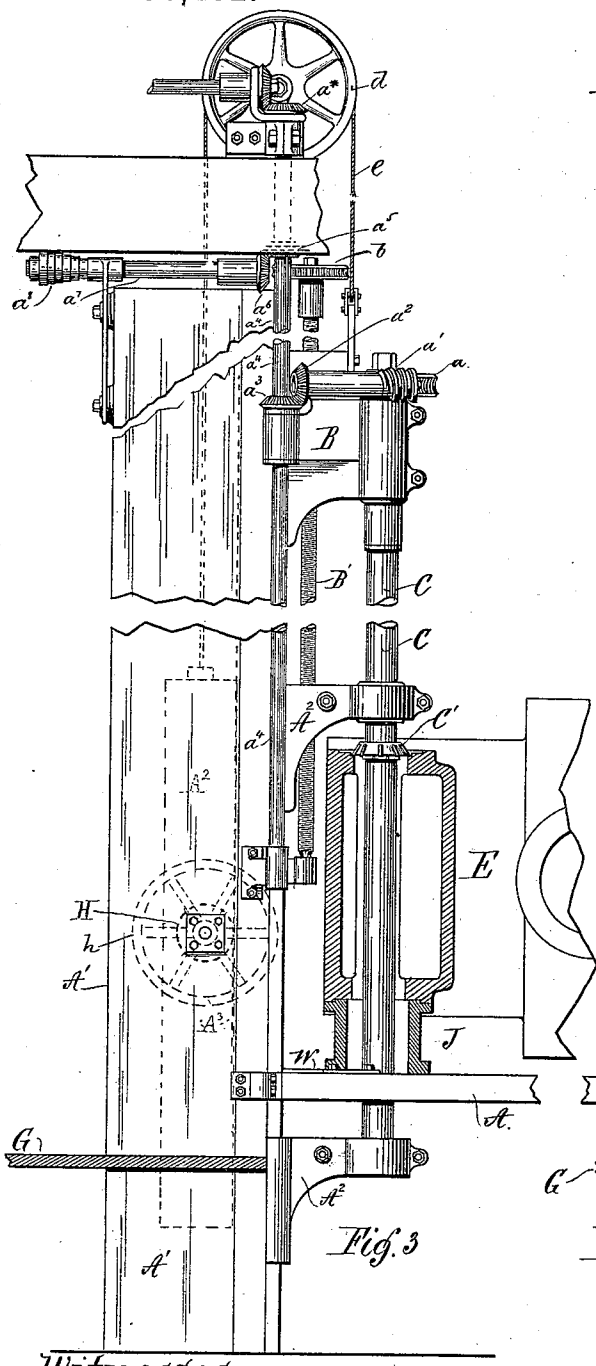


Fig. 3

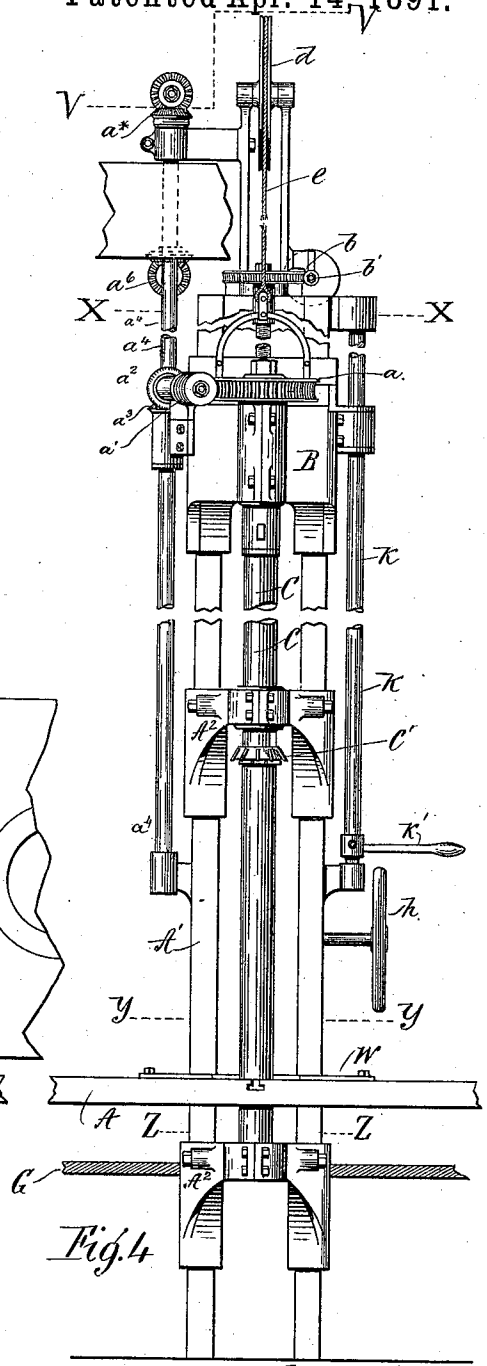


Fig. 4

Witnesses:
Henry Marsh Jr.
Maria L. Corliss

Inventor.
Emily A. Corliss,
Administratrix of the Estate
of George H. Corliss.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 3 Sheets—Sheet 3.

G. H. CORLISS, Dec'd.

E. A. CORLISS, Administratrix.

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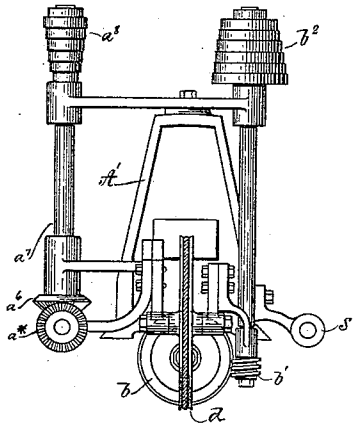


Fig. 5

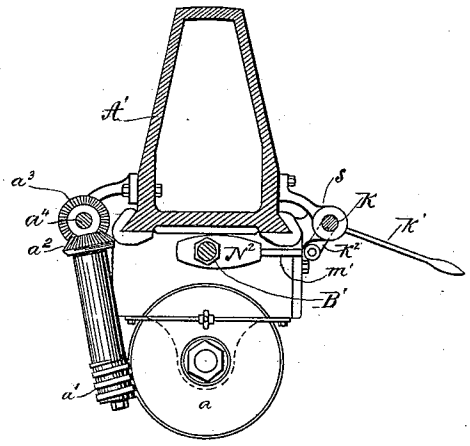


Fig. 6

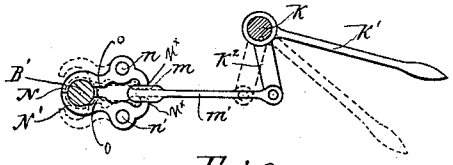


Fig. 9

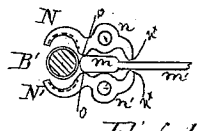


Fig. 10.

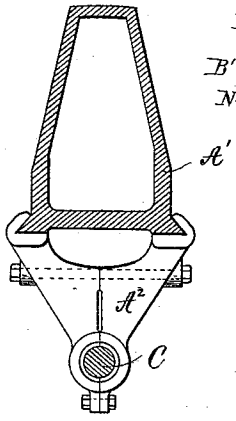


Fig. 8

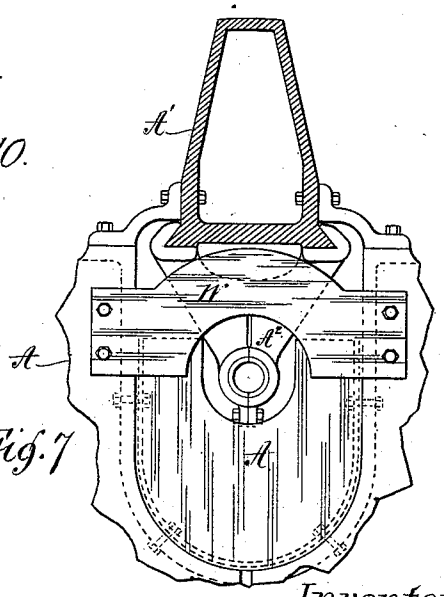


Fig. 7

Witnesses:
Henry Marsh Jr.
Maria L. Corliss

Inventor.
Emily A. Corliss
Administratrix of the Estate of
George H. Corliss

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

EMILY A. CORLISS, OF PROVIDENCE, RHODE ISLAND, ADMINISTRATRIX OF GEORGE H. CORLISS, DECEASED.

MACHINE FOR BORING THE VALVE-BOXES OF CYLINDERS OF STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 450,402, dated April 14, 1891.

Application filed December 21, 1889. Renewed November 6, 1890. Serial No. 370,453. (No model.)

To all whom it may concern:

Be it known that GEORGE H. CORLISS, deceased, late a citizen of the United States, resident in the city and county of Providence, in the State of Rhode Island, (represented by EMILY A. CORLISS, administratrix,) invented a new and useful Machine for Boring the Valve-Boxes of Steam-Engine Cylinders, of which the following is a specification.

Said GEORGE H. CORLISS had found that in order to secure an accurate relative movement of the valves of a steam-engine cylinder the valve-boxes should be bored parallel with each other and equidistant from the center of the wrist-lever support and at exact right angles to the center line of the cylinder.

It is the purpose of his invention herein described to provide a machine which will with accuracy bore the several valve-boxes equidistant from the center of the wrist-lever support and parallel with each other and at exact right angles to the center line of the cylinder, and which will also be capable of performing this duty simultaneously upon a number of cylinders of the same or of differing dimensions.

In the machine illustrated in the accompanying drawings provision is made for boring the valve-boxes of six cylinders at the same time; but the parts are all alike except that some are larger than others, and a description of one will suffice for all. A counterbalanced tool-carriage, gibbed and movable vertically upon an upright post, carries with it a vertical boring-bar furnished with a cutter-head containing a series of cutters and arranged to be driven by a worm and gear. The boring-bar is guided and steadied and its alignment maintained by vertically-adjustable bearings gibbed upon said upright post one above the other. Provision is made for feeding the boring-bar downward through the bed of the machine, which is elevated and secured to the upright posts, and is built preferably in semicircular form to bring all portions of it within the sweep of a single crane. Provision is also made for causing or stopping at will the automatic downward feed of the boring-bar and provision for raising the boring-bar to withdraw the cutter-head for examination of the work and removal of chips, all without stopping the machine. The boring-bar and cutter-head are also lowered at will by the same means which serve to raise them. The cylinder is supported and centered during the operation of boring the valve-boxes by jigs finished at one end to fit the counterbore previously made in the ends of the valve-boxes and bolted one on the end of each valve-box and finished at the other end or base to fit a semicircular yoke bolted to the bed of the machine near the upright post with its semicircular recess exactly concentric with the axis of the vertical boring-bar. As the cylinder having these jigs bolted to the ends of the valve-boxes is moved into position on the machine the circular base of that jig bolted to the valve-box about to be bored is received in the semicircular recess in the yoke and compelled to stand with its center exactly coinciding with the center or axis of the boring-bar. The remaining three jigs bolted one on the end of each of the other valve-boxes are bolted or otherwise secured to the bed or table of the machine. The boring-bar, with its tool or series of tools, being revolved and fed downward, the valve-box is bored at one or more operations to the size and cylindrical condition required and by necessity in the correct line and in the correct position in every respect. After the valve-box is bored the cylinder is moved upon the table of the machine to bring the next valve-box under the boring-tool, when the cylinder is again secured in position and that valve-box is bored, and so on until each of the four valve-boxes have in succession been treated. The cylinder is then, so far as the boring of the valve-boxes is concerned, complete and all cylinders of equal size treated upon this machine are, so far as their valve-boxes are concerned, interchangeable.

In the accompanying drawings, Figure 1 is a front elevation of the machine with a cylinder in position thereon for boring the valve-box. Fig. 2 is a sectional top plan of the machine. Fig. 3 is a side elevation of a part of the machine, showing a sectional view of the valve-box of a cylinder and a central section through a jig. Fig. 4 is a front elevation of the same part of the machine. Fig. 5 is a top plan and partial section of the post on the broken line V V of Fig. 4, certain parts being omitted. Fig. 6 is a section on line *x x* of

Fig. 4. Fig. 7 is a top plan and partial section on line *y y* of Fig. 4, with the boring-bar removed. Fig. 8 is a section on line *z z* of Fig. 4. Fig. 9 is a top plan of the clutch-nut and its connections, and Fig. 10 is a corresponding plan view showing the clutch-nut opened.

Similar letters of reference indicate like parts where they occur in the drawings.

A represents the plane table or bed of the machine; A′, upright hollow posts, to which the bed is rigidly secured with its plane surface at exact right angles to the vertical plane of the said posts. Upon each post A′ is gibbed a counterbalanced carriage B, which carries a vertical boring-bar C, furnished with a cutter-head C′, containing a series of cutters. The carriage B is connected with its counterbalance-weight B^2, contained within the post A′, by a rope or chain *e* passing over a grooved pulley *d*. The hand-wheel *h* serves to raise and lower the counterbalance-weight by actuating a pinion H, (shown in dotted lines, see Fig. 3,) which engages a rack A^3, (shown in dotted lines,) contained within the post A′, and thereby at will to raise or lower the carriage B and its connections for purposes of adjustment, as well as for withdrawal of the tool. The bar C and its tool C′ are driven by the worm and gear *a′ a*, connected by bevel-gears a^2 a^3 with the vertical driving-shaft a^4, to which power is conveyed through bevel-gears overhead. Power is also taken from the vertical shaft a^4 through bevel-gears a^5 a^6, shaft a^7, cone-pulleys a^8 and b^2, connected by a belt, worm *b′*, and gear *b* to drive a vertical threaded shaft B′. Automatic downward feed of the cutting-tool and its connections is attained by means of a clutch-nut secured to the carriage B and actuated at will to close snugly upon the threaded shaft B′, which is driven by the same driving-shaft a^4 which drives the boring-bar C. This clutch-nut is made in two parts N N′, provided with corresponding threaded portions and cam-surfaces $N^\times$ O and pivotally held upon the carriage B with such similar portions and surfaces opposed. Bolts *n n′* serve to hold, respectively, the parts N and N′, and as pivots upon which the latter oscillate as actuated by a cam-wedge *m*, moved to and fro between the cam-surfaces to cause the threaded portions of N and N′ to approach each other to clasp the shaft B′ and to recede from each other to release the shaft B′. The arm *m′* of the wedge is connected with a crank-arm k^2, keyed upon the shaft *k*. A casing N^2 covers and protects the clutch-nut.

Vertically-adjustable bearings A^2A^2, gibbed one above the other upon the post A′, serve to guide and steady the boring-bar and to maintain its alignment. One of these bearings is located above and the other below the table or bed of the machine, and the boring-bar is thus guided and steadied on both sides of the cutting-tool.

J J represent jigs, of which there are four used to a cylinder and bolted one on the end of each valve-box.

W represents a yoke bolted or otherwise secured firmly upon the table A adjacent to the post A′ and having a semicircular recess adapted to receive with a close fit the base of one of the jigs J to center a valve-box. This semicircular recess has been previously bored out by the boring-bar tool and of necessity is exactly concentric with the axis of the boring-tool. The circular base of each jig J is finished to exactly the same diameter as is the recess in the yoke W.

E represents a steam-engine cylinder.

At F^2 is located a hydraulic crane, (not shown,) by means of which the cylinders are placed upon and removed from the machine, the entire table of which is within the sweep of the crane. The table A is elevated somewhat above the floor G of the shop. A pit beneath the table affords opportunity for access to the under part of the machine for adjustment of guides, inspection of work, and removal of chips.

I claim as the invention of said GEORGE H. CORLISS, and desire to secure by these Letters Patent—

1. A machine for boring the valve-boxes of steam-engine cylinders and for analogous purposes, consisting of the following elements in combination: a horizontal plane-table, yokes or guides secured thereto and each provided with a semicircular recess adapted to receive jigs fitted therefor, and thereby center and hold the valve-box in the correct line with the boring-tool, a vertical post, said table being rigidly secured to such post, a tool-carriage movable up and down upon such post and carrying a vertical boring-bar equipped with a boring-tool, means for raising and lowering such carriage and its connections at will, means for securing automatic movement of such carriage and its connections to feed the boring-tool, and means for driving by power said boring-bar and the feeding mechanism.

2. In the provisions for securing mechanical feed in a boring-machine, a constantly-revolving screw-threaded shaft, a clutch-nut composed of two pivoted parts N N′, each having two cam-surfaces and a threaded surface, and a cam-wedge *m*, adapted to both open and close the parts, in combination with each other, and means for conveniently actuating such cam-wedge to and fro at will to positively engage and positively release the said threaded shaft, all substantially as herein specified.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

EMILY A. CORLISS,
Administratrix of the estate of George H. Corliss, deceased.

Witnesses:
HENRY MARSH, Jr.,
MARIA L. CORLISS.