J. A. MACKINNON.

Device for Finishing Metallic Surfaces.

No. 242,950. Patented June 14, 1881.

Fig. 1.

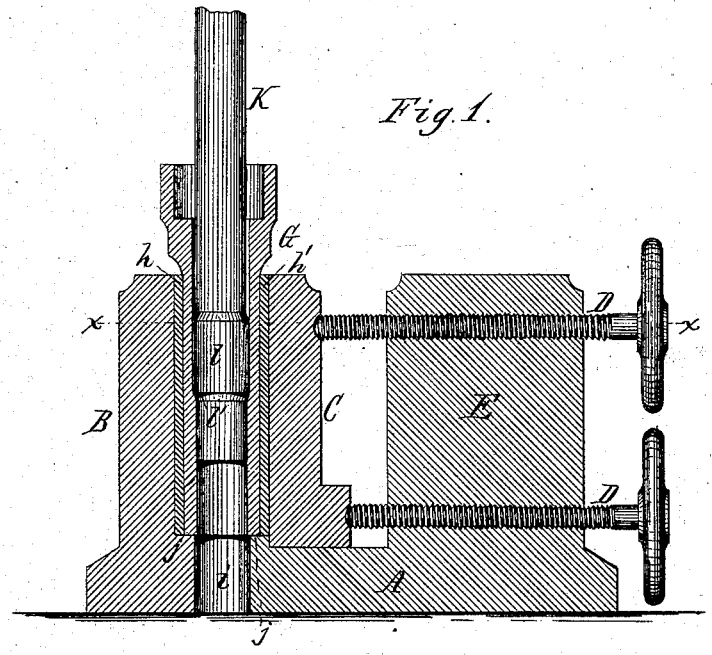


Fig. 2.

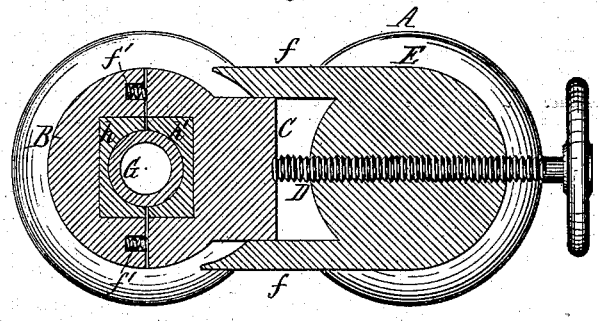
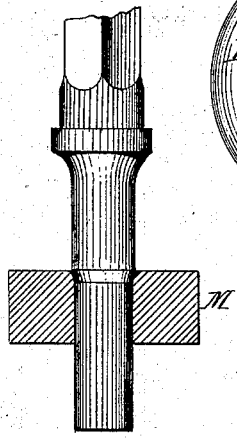


Fig. 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN A. MACKINNON, OF CALEDONIA, NEW YORK.

DEVICE FOR FINISHING METALLIC SURFACES.

SPECIFICATION forming part of Letters Patent No. 242,950, dated June 14, 1881.

Application filed October 14, 1879.

To all whom it may concern:

Be it known that I, JOHN A. MACKINNON, of Caledonia, in the county of Livingston and State of New York, have invented new and useful Improvements in the Method and Apparatus for Finishing Metallic Surfaces, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to an improvement in the method and apparatus for gaging and finishing metallic surfaces having a straight cylindrical or analogous form—for instance, the spindles of carriage-axles, lathe-spindles, cotton-spindles, and the bearings thereof, guns and cannon, and a great variety of similar devices which have to be made of a certain gage or caliber.

Articles of the above description are usually made by turning or boring the cylindrical part in a suitable lathe and then finishing the turned or bored surface with oil and emery. The extent to which the oil and emery are applied is optional with the mechanic, and depends upon the degree of finish already given to the article in turning or boring. The finishing operation is consequently continued for a greater or less time in articles of the same size, and the gage or caliber is thereby changed more in one article than in another of the same kind, thereby rendering the same of unequal caliber, strictly speaking.

Cylindrical articles have also been finished by compressing-dies, which at the same time compress and elongate the metal, whereby the articles are polished, without, however, producing the desired degree of hardness in the skin, and without producing articles of an exact gage.

The object of my invention is to overcome the defects in the above-named methods; and it consists, to that end, in the hereinafter-described method and apparatus for simultaneously gaging and finishing metallic surfaces of straight cylindrical form without elongation.

In the accompanying drawings, Figure 1 is a sectional elevation of an apparatus adapted to hold hollow cylindrical parts, such as axle-boxes, during the operation of finishing. Fig. 2 is a horizontal section in line *x x*, Fig. 1. Fig. 3 represents an elevation of one of the compressing-tools for finishing hollow articles. Fig. 4 represents a sectional view of a compressing-tool for finishing solid cylindrical articles, the tool being shown applied to the spindle of a carriage-axle.

Like letters of reference designate like parts in the several figures.

In Figs. 1 and 2, A represents the base-plate of the clamping apparatus.

B is the stationary jaw, cast in one piece with the base-plate A, and C is the movable jaw, adapted to slide on the base-plate A toward and from the fixed jaw B.

D D are two screws bearing against the movable jaw and working in threaded openings in a bearing, E, cast with the base-plate A. The base-plate A is preferably provided with two parallel ribs, *f*, forming ways between which the movable jaw C moves toward and from the fixed jaw B.

f' represents spiral or other suitable springs arranged between the jaws B C, for separating the same when the screws D are released.

G represents a carriage-axle box placed between the jaws B C. As the latter should be capable of holding hollow articles of different sizes, they are preferably each constructed with a rectangular recess, in which is inserted a bearing-piece, *h h'*, respectively fitting snugly in the recess of the jaw, and having its concave side shaped to receive the article desired to be finished. By providing a pair of bearings, *h h'*, for each different kind of article, the same clamping apparatus may be used for all by simply inserting the proper pair of bearing-pieces *h h'* in the jaws.

The base-plate A is provided with an opening, *i*, arranged in the axial line of the jaws, and made of sufficient size to permit the largest compressing-tool to pass freely through the opening, and somewhat smaller than the article to be operated upon, so as to form an offset or shoulder, *j*, upon which the article rests.

K, Fig. 3, represents a compressing-tool for operating upon a hollow cylindrical article. It consists of a straight mandrel having a slight cylindrical enlargement, *l*, of the size to which it is desired to compress the article. The end of the enlargement which enters the bore of the article first is slightly beveled, as shown at *l'*.

When it is desired to finish an axle-box like that shown in Figs. 1 and 2, the box, having

been previously turned or bored out in the ordinary manner, is arranged between the clamping-jaws, as shown, and the movable jaw C is pressed tightly against the box by means of the screws D. A compressing-tool of the form shown in Fig. 3, and having its enlargement *l* made about one-sixteenth of an inch larger than the bore of the box, is then forced through the bore by means of any suitable press. The metal of the box is thereby compressed to the size of the enlargement *l* of the tool. If the desired caliber is larger than this first tool, a second and third tool are forced through the bore, all of similar construction and increasing slightly in size, the last tool forced through being of the exact caliber to which it is desired to finish the article. In this manner all the axle-boxes or other articles which are finished by the same tool are made of exactly the same caliber, without requiring any particular skill on the part of the operator. Solid cylindrical parts are finished in the same manner by forcing a hollow compressing-tool, M, over the article. The tool M is provided with a cylindrical bore, which is slightly beveled at the end which first comes in contact with the article operated upon. The tool is arranged in a suitable head or carrier, which is of sufficient strength to prevent the expansion of the tool, and is forced over the article by a suitable press. If the article is of a shape which does not permit the compressing-tool M to pass over it from end to end—as, for instance, the carriage-spindle shown in Fig. 4—the article is reversed when the tool has reached the limit of its movement and the tool is forced back by the press. The compressing-tools are constructed of steel and hardened, so as to be perfectly rigid and unyielding.

By finishing articles by compression, as above described, the pores of the metal are closed and the bearing-surfaces are made harder and smoother than by the ordinary mode of finishing, which merely renders the metal smooth without increasing its density, and the articles produced by my process are consequently better adapted to resist wear, and operate with less friction.

My improved method of finishing is especially valuable in the construction of articles which are manufactured in large quantities, and which are required to be of exactly the same caliber, so that each one may take the place of another in a machine—as, for instance, cotton-spindles, carriage-spindles, &c.

By forcing the compressing-tool over the turned or bored surface of the article under treatment toward the end at which the article is supported the metal is prevented from flowing in the longitudinal direction of the article, but is displaced in a lateral direction, thereby rendering the metal more compact without causing the article to become lengthened or extended.

I claim as my invention—

1. The method of simultaneously gaging and finishing metallic articles of straight cylindrical form, which consists in first turning or boring the article and then forcing one or more compressing-dies having an unbroken surface externally over the turned surface of a solid cylinder, or internally over the bored surface of the hollow cylinder toward the end at which the cylinder is supported, whereby the metal is condensed to a given caliber without elongation, and at the same time polished.

2. A clamping apparatus composed of a fixed jaw, B, movable jaw C, actuating-screws D, and removable bearings *h h'*, substantially as set forth.

JOHN A. MACKINNON.

Witnesses:
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