(No Model.) 2 Sheets—Sheet 1

J. HARTNESS.

TOOL FOR TURNING TAPERING SURFACES.

No. 501,273. Patented July 11, 1893

Fig. 1

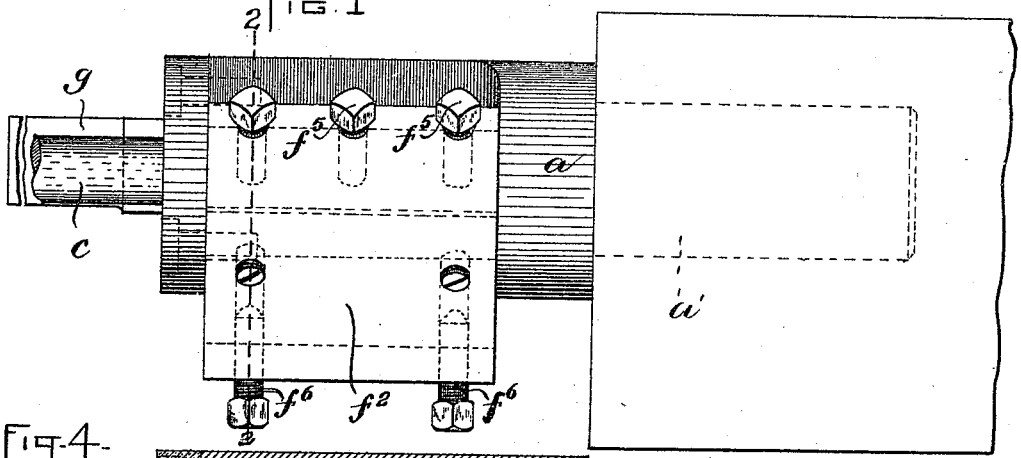


Fig. 4.

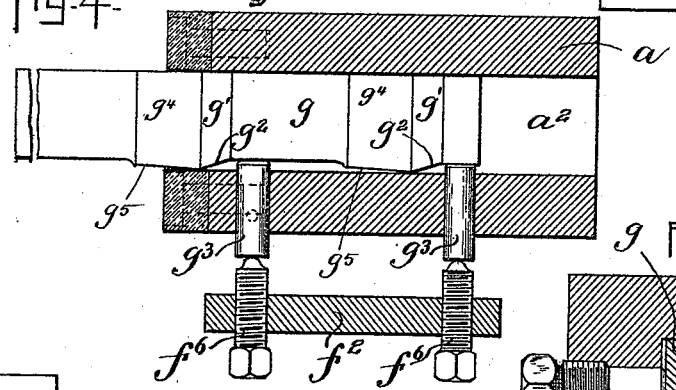


Fig. 2.

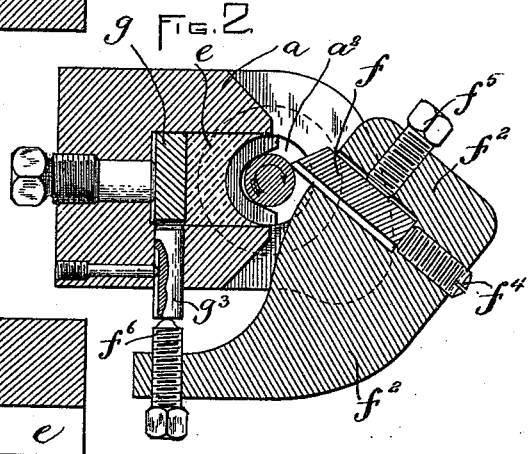
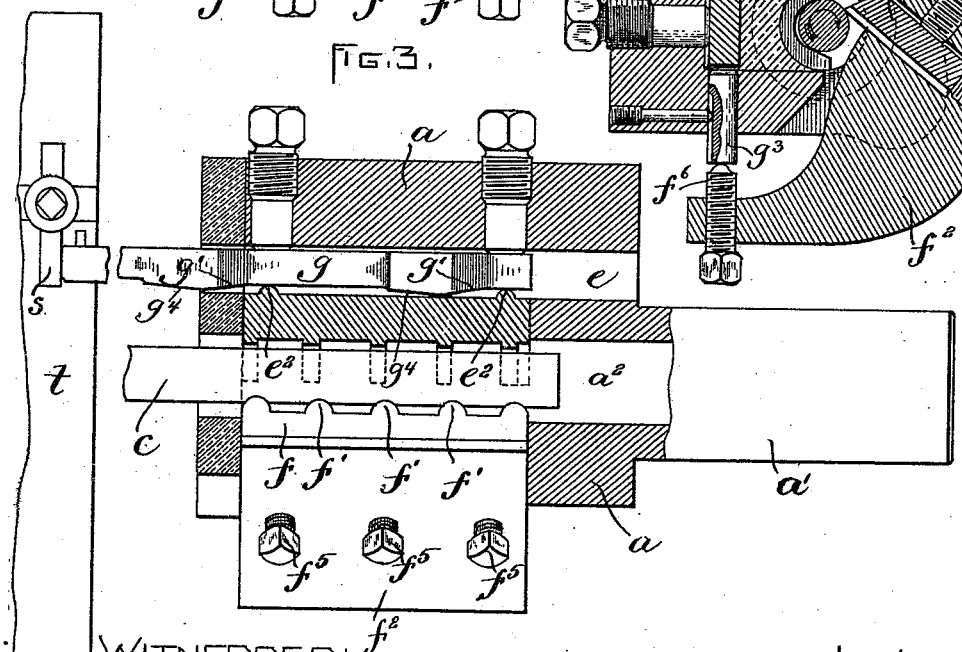


Fig. 3.



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(No Model.) 2 Sheets—Sheet 2.

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TOOL FOR TURNING TAPERING SURFACES.

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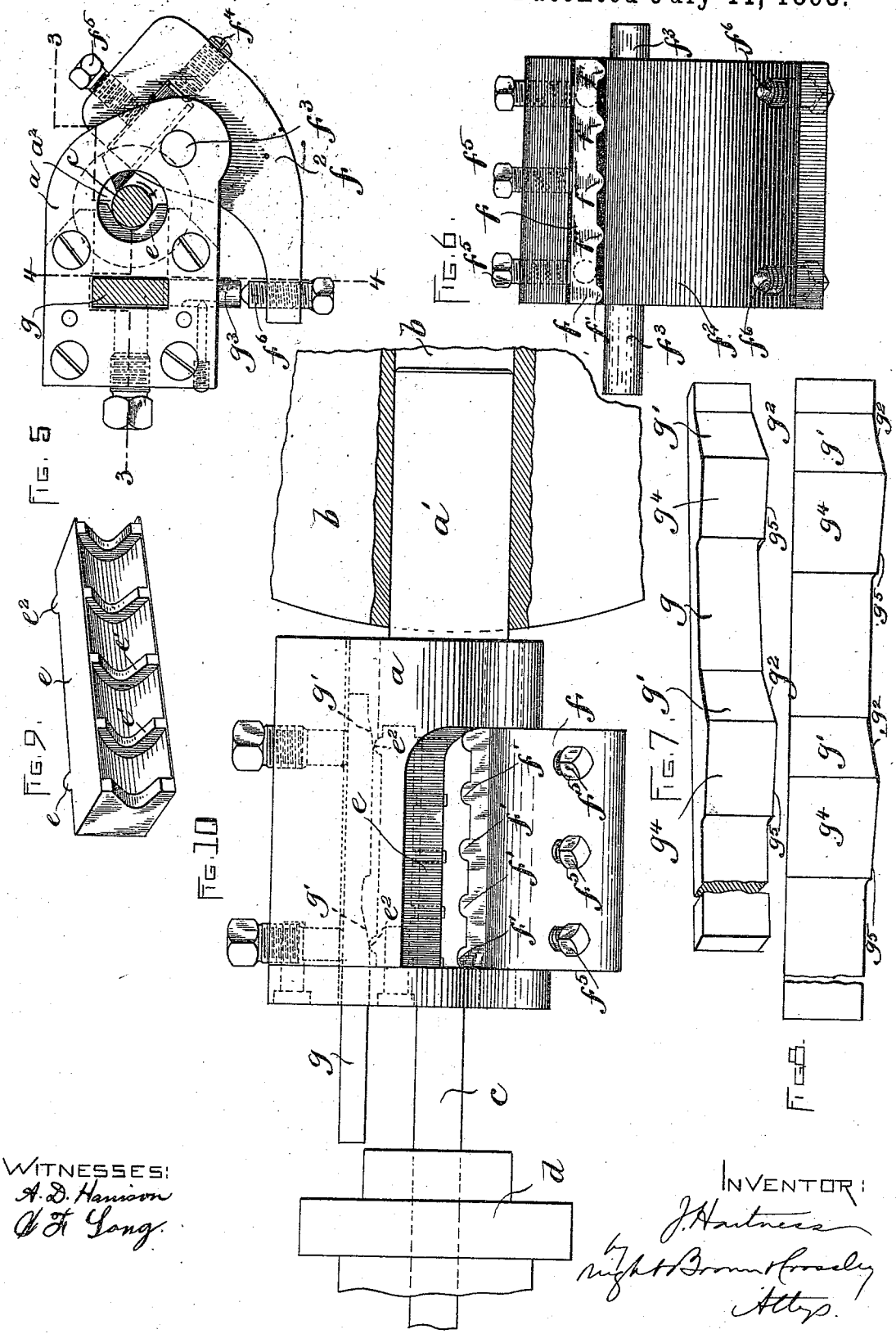

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UNITED STATES PATENT OFFICE.

JAMES HARTNESS, OF SPRINGFIELD, VERMONT.

TOOL FOR TURNING TAPERING SURFACES.

SPECIFICATION forming part of Letters Patent No. 501,273, dated July 11, 1893.

Application filed May 4, 1892. Serial No. 431,800. (No model.)

To all whom it may concern:

Be it known that I, JAMES HARTNESS, of Springfield, in the county of Windsor and State of Vermont, have invented certain new and useful Improvements in Tools or Appliances for Turning Tapering Surfaces, of which the following is a specification.

This invention has for its object to provide a tool or appliance, adapted to be used in connection with a lathe or screw machine, for the purpose of turning tapering surfaces on rods or bolts, the appliance being intended chiefly for turning tapering bolts or pins used in locomotive construction, the rod or bolt to which a tapered surface is to be imparted being held and rotated by a chuck during the tapering operation, which operation is performed by the longitudinal movement of the appliance constituting my improvement upon the rotating bolt; or, if preferred, by the longitudinal movement of the rotating bolt into the appliance.

The invention consists mainly in a taper-turning appliance, comprising in its construction a casing or holder, a back-rest, and a cutter, both the back-rest and cutter being movable laterally in said casing, and means for moving the back-rest and cutter simultaneously in opposite directions in the casing, the back-rest and cutter, when so moved, co-operating in reducing the surface of a rod which projects into the casing, or upon which the casing projects, the cutter having a series of cutting edges, separated by intermediate spaces, so that the cutter acts simultaneously at a number of points on the rod, and is caused by the longitudinal movement of the casing or rod, as the case may be, to reduce the rod simultaneously at as many points as there are cutting edges on the cutter.

The invention also consists in certain details and combinations of devices incidental to the purposes of my invention, all of which I will now proceed to describe.

Of the accompanying drawings, forming part of this specification: Figure 1 represents a side elevation of a taper-turning appliance, and a portion of the lathe turret which supports the same. Fig. 2 represents a section on line 2—2, Fig. 1. Fig. 3 represents a section on line 3—3, Fig. 5. Fig. 4 represents a section on line 4—4, Fig. 5. Fig. 5 represents an end elevation of the construction shown in Fig. 1. Fig. 6 represents a side view of the cutter-holder, detached from the casing of the device. Fig. 7 represents a perspective view of the former or device which moves the back-rest and cutter laterally in the casing. Fig. 8 represents a side elevation of the former. Fig. 9 represents a perspective view of the back-rest. Fig. 10 represents a top view of the construction shown in Fig. 1, showing in addition a portion of the work-holding and rotating chuck, a portion of the turret being broken away and shown in section.

The same letters of reference indicate the same parts in all the figures.

In the drawings: *a* represents the casing or main body of the device, the same being provided with a shank *a'*, adapted to be inserted in a socket *b'* in a lathe turret *b*. The casing *a* is provided with a longitudinal cavity or chamber a^2, which receives the rod *c*, whose periphery is to be turned to a taper, said rod being held and rotated by a chuck *d*. The arrangement of the casing *a* is such that, when it is secured to the turret and the turret properly adjusted, the chamber a^2 will be in line with the rod *c* held by the chuck, so that, by a movement of the turret toward the chuck, the rod *c* may be caused to project into the chamber a^2.

e represents a back-rest, which is located in the casing *a*, and is preferably provided with a series of curved ribs *e'*, arranged to bear upon one side of the rod *c*. The back-rest *e* is movable laterally within the casing, for a purpose which will presently be explained.

f represents the cutter, which is here shown as composed of a single blade or piece, extending lengthwise of the casing *a*, and provided with a series of cutting edges *f'*, separated by intervening spaces, the cutter, with its isolated cutting edges *f'*, constituting a multiple cutter adapted to operate simultaneously at a number of points on the rod *c*. The cutter *f* is secured to an oscillatory cutter-holder f^2, which is pivotally connected with the casing *a* by means of trunnions f^3 f^3 (Figs. 5 and 6), projecting from the ends of the cutter-holder into sockets formed in the casing *a*. The arrangement of the cutter-

holder is such that its oscillating movements cause the cutter f to move laterally in the casing a toward and from the back-rest e, the cutting edges of the cutter being arranged to bear upon the rod c at a point substantially opposite the back-rest, as shown in Figs. 2, 3 and 5. The cutter-holder f^2 is provided with a longitudinal slot or pocket to receive the cutter, and with adjusting screws f^4 to move the cutter forward in compensation for the wear of its cutting edges, and with clamping screws f^5 to secure the cutter at any point to which it may be adjusted.

g represents a bar or former, which is movable longitudinally in a way or channel formed in the casing a for its reception. The bar or former g is provided with a series of preferably two lateral inclines g' g' at one side, and a corresponding series of downwardly projecting inclines g^2 g^2 at its lower edge. The back-rest e is provided at its rear with ribs e^2 e^2, which are arranged to co-operate with the inclines g' g' in forcing the back-rest inwardly toward the center of the rod-receiving chamber a^2 when the relative positions of the casing a and the former g are being changed so as to change the contact of the ribs e^2 e^2 from the inner ends of the inclines g' g' to the outer ends thereof. The former is also provided with inclines g^4 g^4, adjoining the inclines g' g', and with inclines g^5 g^5 adjoining the inclines g^2 g^2, the inclination of g^4 g^5 being opposite that of g' g^2, but less abrupt. The inclines g' g^2 are arranged to force the back-rest and cutter forward or toward the center of the rod at a comparatively rapid rate, thus causing the cutters to enter the work to the required depth, and the inclines g^4 g^5 are arranged to follow the inclines g' g^2 and permit the cutter and back-rest to recede at a slower rate from the center of the rod, and form the tapered surface thereon while receding, as will be presently described.

I make use of the expression when the relative positions of the casing and former are being changed because the apparatus may be operated as hereinafter described by moving either the casing or the former longitudinally; that is to say, the former may be held in a fixed position while the casing is moved in the direction required to carry the back-rest ribs from the inner to the outer ends of the inclines g' to force the back-rest inwardly, and from the outer to the inner ends of the inclines g^4 to permit the back-rest to move outwardly; or the casing may be held stationary and the former moved to accomplish the same result, namely, the lateral movement of the back-rest alternately toward and from the center of the rod-receiving chamber in the casing a.

The inclines g^2 g^2 of the former are arranged to impart an inward or forward motion to the cutter-holder f^2, and thus cause the cutter f to swing inwardly toward the center of the rod-receiving chamber, while the back-rest is being moved toward said center, and the inclines g^5 g^5 of the former are arranged to permit the cutter to move outwardly when the back-rest is moving outwardly, the back-rest and cutter being moved simultaneously in opposite directions. I prefer to interpose between the inclines g^2 g^2 and the cutter-holder, studs g^3, which are fitted to move vertically in sockets in the lower portion of the casing a, their lower ends bearing upon adjustable screws or studs f^6 f^6, affixed to the cutter-carrier f^2. The same relative movement that causes the described movement of the back-rest toward and from the center of the rod-receiving chamber, first causes the inclines g^2 to depress the lower portion of the cutter-holder f^2 and thus move the cutter f toward the center of the rod-receiving chamber, and then causes the inclines g^5 to permit the opposite movement of the cutter.

The operation of the device is or may be as follows: The rod c being rotated by the chuck without being moved endwise, and inserted suitably in the chamber a^2, the body or casing a is moved forward toward the chuck by the movement of the turret b, and at the same time the relative positions of the casing a and the former g are changed, by reason of the fact that the former is arrested by bearing against a fixed surface on the head-stock of the lathe, or elsewhere, so that, as the casing moves forward, the inclines g' g' g^2 g^2 act to move the back-rest e and the cutter f simultaneously inward, and then the inclines g^4 g^4 and g^5 g^5 act to permit the back-rest and cutter to be moved slowly outward by the pressure of the work against them. These motions of the back-rest and cutter, occurring during the longitudinal movement of the cutter and the casing, cause the isolated cutting edges f' to act simultaneously in first entering the work to the required depth, and then gradually receding from the center of the work, thus forming the taper. The inclines g^4 g^5 should be of the correct taper or inclination to give the desired taper to the work, but the other inclines may be at any angle desired. The inclines g^4 g^5 are so slight that, if shown in the drawings as used, they would not be perceptible; hence I have exaggerated them for clearness of illustration.

It will be seen that the entire travel or lengthwise movement of the casing required is only the distance between one cutter or cutting edge f' and the next, so that the time consumed in forming the tapering surface is much less than would be required if the cutters were fixed, or in other words had no lateral movement, in which case the casing would have to move the entire length of the tapered surface in forming the latter.

It will be seen that, by dividing up the work among a number of cutters, and moving the cutters laterally during the operation, a considerable saving of time is effected in forming a tapered surface on a rotating rod or bolt.

It is obvious that the casing a may be held stationary instead of moving endwise, in which

case the rod *c* and the former *g* will be moved endwise, the result being the same as that already described.

In Fig. 3, I show a fixed support *s* on the head-stock *t* of a lathe, arranged to prevent movement of the former *g* while the casing *a* is approaching said head-stock. The head-stock and support may be supposed, however, to move toward the casing *a*, the latter being fixed. Although this scheme, as shown, is used for operating on slender work, which requires the use of a back-rest, I do not limit myself to the use of a back-rest, but may use the multiple-cutter without the back-rest.

The cutter may be made as shown in one piece, or in a number of pieces, without departing from the spirit of the invention.

I claim—

1. In a taper-turning appliance, the combination of a casing or holder, a back-rest movable laterally, a cutter-holder pivotally connected to the casing, a cutter held in said cutter-holder, and means for moving said back-rest and cutter simultaneously toward the center of the casing, whereby the back-rest and cutter are caused to co-operate in reducing a piece of work interposed between them, as set forth.

2. In a taper-turning appliance, the combination of a casing or holder, a back-rest movable laterally, a cutter-holder pivotally connected to the casing, a cutter held in said cutter-holder, a bar or former movable longitudinally and provided with inclines adapted to impart lateral motion to the back-rest and cutter when the relative positions of the casing and former are being changed, as set forth.

3. In a taper-turning appliance, the combination of a casing or holder, a back-rest movable laterally, a cutter-holder pivotally connected to the casing, a cutter held in said cutter-holder, separate inclines provided for actuating the back-rest and cutter-holder, as set forth.

4. The combination of a chuck for holding and rotating a rod, a casing or holder having a rod-receiving chamber, a multiple-edged cutter and a back-rest arranged to bear simultaneously on opposite sides of a rod in said chamber, means for changing the relative positions of the rod and casing or holder to increase the projection of the rod into the casing, and means for simultaneously moving the back-rest and cutter toward each other during the change in the lateral positions of the rod and casing, as set forth.

5. In a taper-turning appliance, the combination of a casing or holder, a series of back-rest surfaces and a series of cutting edges both movable laterally in said casing, a bar or former movable longitudinally and provided with inclines adapted to impart a lateral motion to the back-rests and cutting edges when the relative positions of the casing and the former are being changed, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 26th day of April, A. D. 1892.

JAMES HARTNESS.

Witnesses:
W. D. WOOLSON,
G. OTIS GRIDLEY.