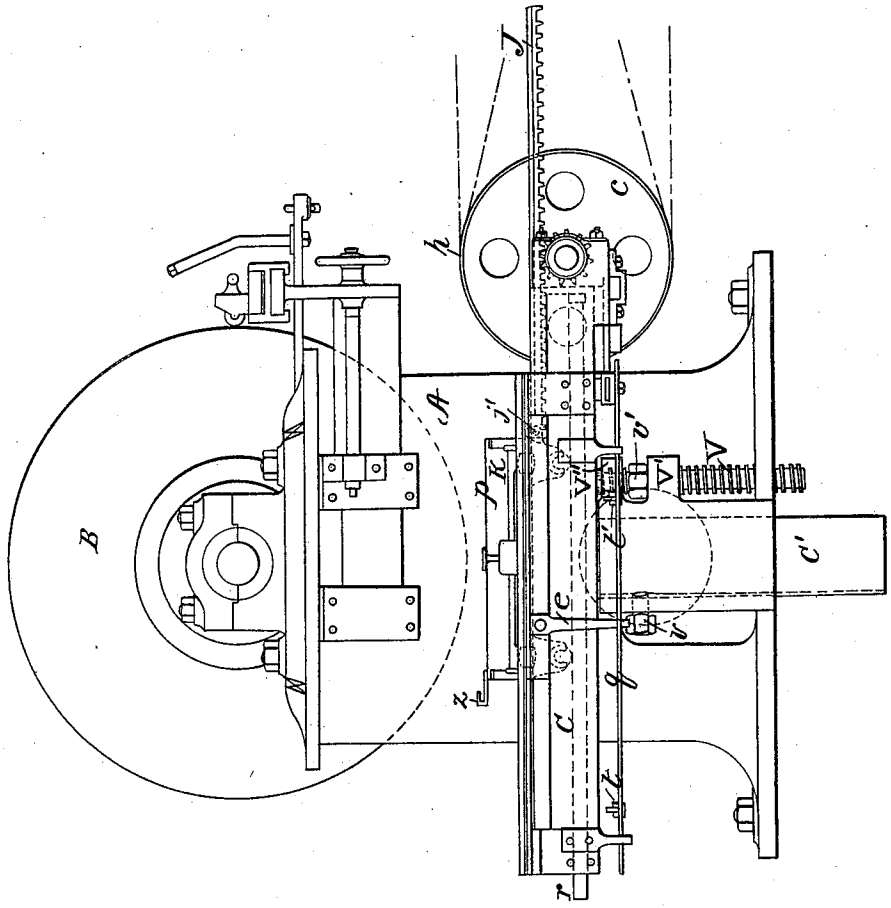
(No Model.) 3 Sheets—Sheet 1.

A. ESPINASSE.

GRINDING MACHINE.

No. 588,637. Patented Aug. 24, 1897.

Fig. 1.



Witnesses
W. R. Edelin,
Rowe Lewis

Inventor.
Adolphe Espinasse,
by Edward Mann,
his attorneys.

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

(No Model.) 3 Sheets—Sheet 2.

A. ESPINASSE.

GRINDING MACHINE.

No. 588,637. Patented Aug. 24, 1897.

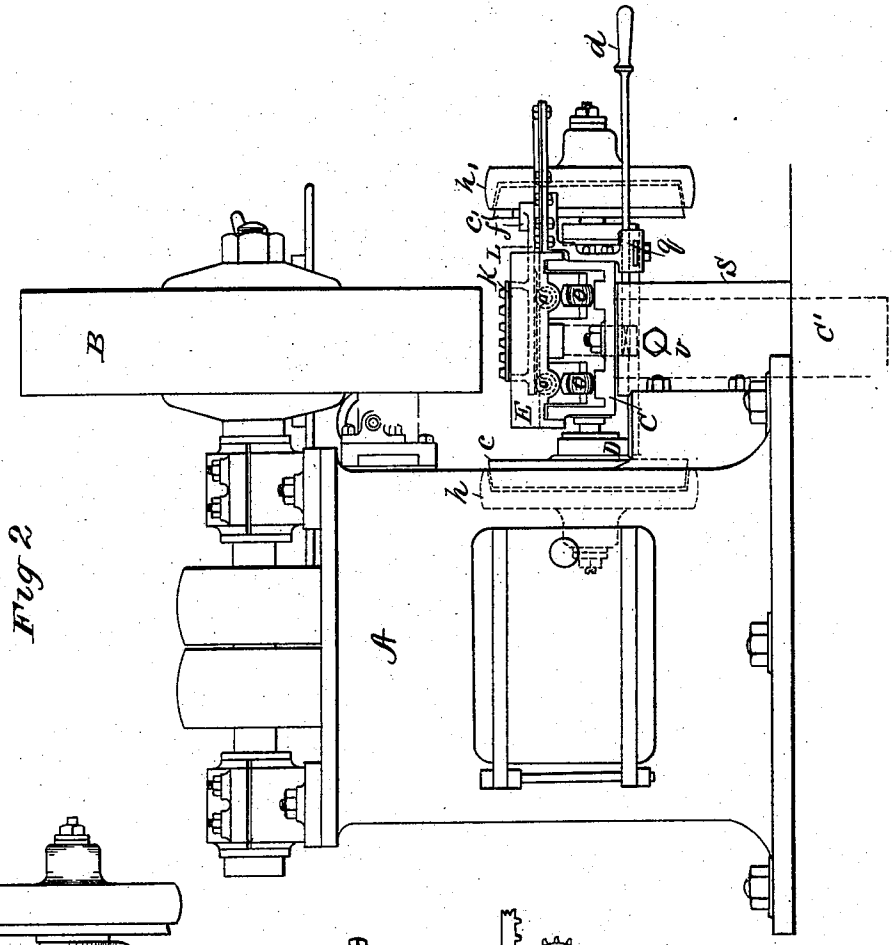


Fig. 2

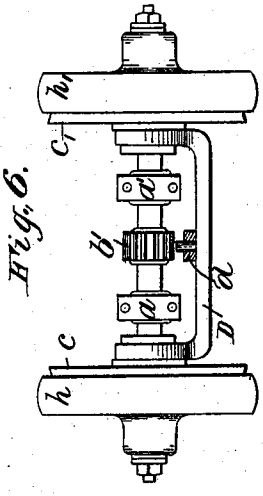


Fig. 6.

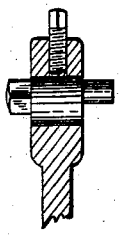


Fig. 7.

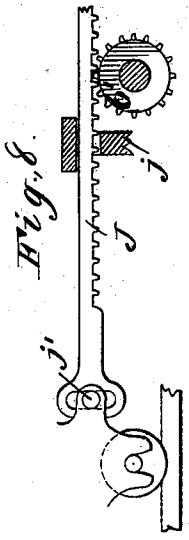


Fig. 8.

Witnesses.
W. R. Edelen.
Penn Lewis.

Inventor.
Adolphe Espinasse
by Howard Mann
his attorneys

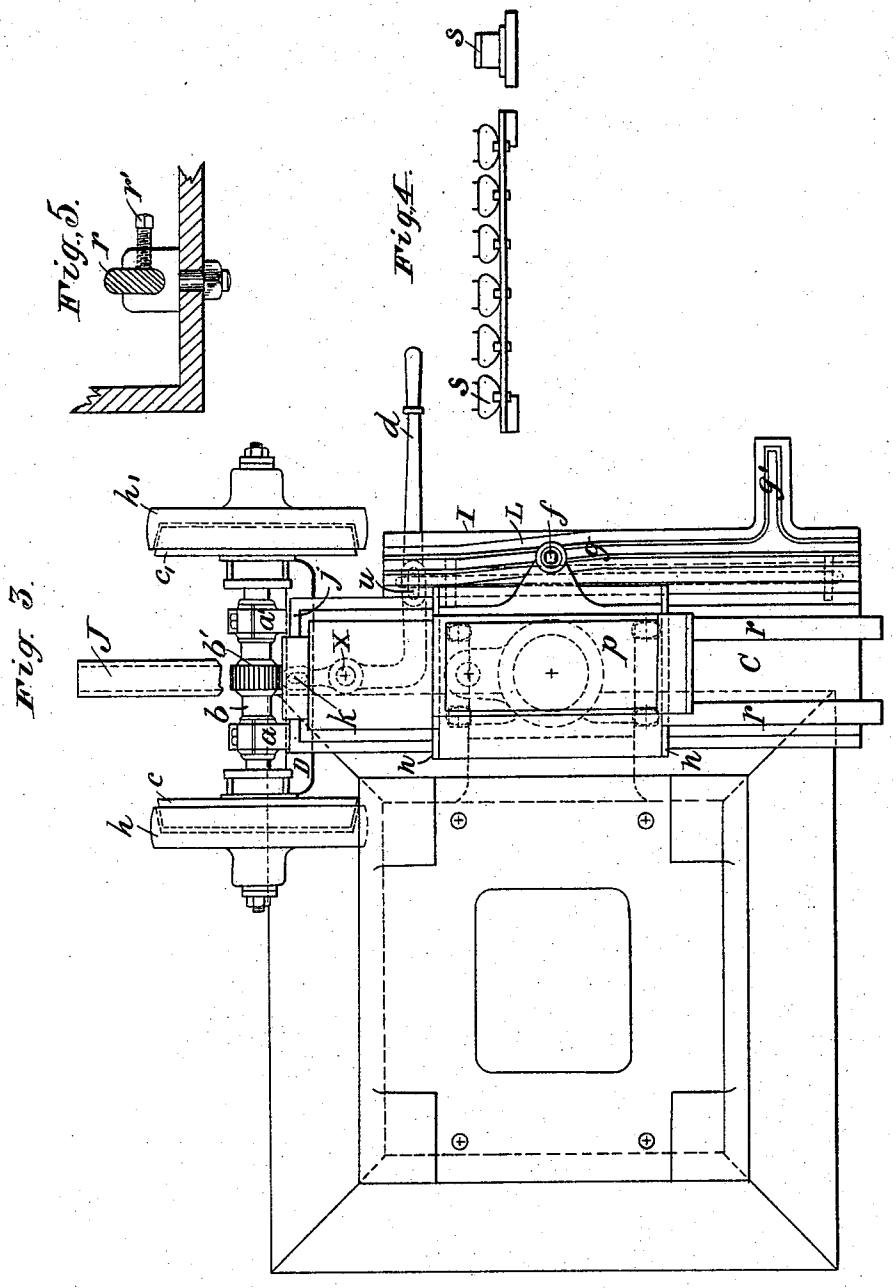
THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 3 Sheets—Sheet 3.

A. ESPINASSE.

GRINDING MACHINE.

No. 588,637. Patented Aug. 24, 1897.



Witnesses.
W. R Edelin.
Rawo Lewis.

Inventor
Adolphe Espinasse
by Foster Brown
his attorneys

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

UNITED STATES PATENT OFFICE.

ADOLPHE ESPINASSE, OF PARIS, FRANCE.

GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 588,637, dated August 24, 1897.

Application filed January 8, 1897. Serial No. 618,476. (No model.)

To all whom it may concern:

Be it known that I, ADOLPHE ESPINASSE, of Paris, in the Republic of France, have invented new and useful Improvements in Grinding-Machines, which are fully set forth in the following specification.

This invention relates to machines for grinding, dressing, polishing, or similarly operating, by means of grindstones or like instruments, upon metal articles—such as files, springs, and other articles of ironwork, edge-tools, and hardware.

It consists in a special work-holding apparatus which is secured against the foundation of the grinding-machine under the grindstone and of which the work-holder can be advanced toward and withdrawn from said stone, all as hereinafter set forth.

In the apparatus there is a trough-shaped head in which are rails with a carriage running thereon, and the work-holder is mounted on said carriage in such a way that it can be shifted transversely thereof, the carriage being provided with clutches or like means for connecting it with and disconnecting it from a carriage-moving mechanism. The work-holder at the forward end of the carriage-movement can be drawn aside from the plane of the grinder, so that the workman can return or replace the metal articles without incurring danger should the grinder fly apart.

Figure 1 is a side elevation of the machine; Fig. 2, a front elevation thereof; Fig. 3, a plan of the same; Fig. 4, views of a work-plate with elastic supports detached from the machine. Fig. 5 is a detail showing the manner of securing the rails in the bottom of the trough. Fig. 6 is a detail of the reversing mechanism. Fig. 7 is a detail of the eccentric for effecting the lateral adjustment of the work-holding plate, and Fig. 8 is a detail of the connection between the carriage and rack for reciprocating the same.

The machine-frame A, the grindstone B, and the other accessory parts may be of any approved construction. The stem C′ of the trough-shaped head C fits in the sleeve S, which is fastened to the machine-frame A. A screw *v*, whose end enters a vertical groove in the stem C′, prevents this latter rotating without preventing its adjustment vertically by the screw V, which passes through the lugs V′ V″ and whose upper end acts upon the trough-shaped head C. A nut *v*′ between the lugs moves the screw vertically. The nut can be turned by a simple key or other means. (Not shown.)

Removable rails *r* are placed on the bottom of the trough-shaped head C (see Fig. 5) and secured by set-screws *r*′. Their top faces are straight or they are curved to agree with the articles to be ground. On these rails, by means of rollers O, runs the carriage E. At the top of the carriage are other rollers *o*, whose axes of rotation are at right angles to those of the rollers O, and on these upper rollers rests the work-holder K, which can be run thereon transversely. The plate which composes the work-holder is provided on top with a peripherical rib and can slide between the cross-ribs *n* at the ends of the carriage E.

At its closed rear end the trough-shaped head C is provided with bearings *a a*′ for a shaft *b*, having a pinion *b*′ keyed fast thereon. At each end of the shaft *b* there is a friction-cone *c c*′, connected with the said shaft by a spline, so that they can be moved endwise of said shaft, while always rotating therewith, and surrounded, respectively, by the rims of continually-rotating loose pulleys *h h*′, the interior of said rims having the same conicity as the cones and being separated therefrom by three or four millimeters when the cones are in their mid-position.

The cones *c c*′ are connected with each other by an arm D, (see Fig. 6,) sliding in a guide under the end of the trough-shaped head C and movable by means of a lever *d*, whose short end is connected with this arm by a pivot-pin *k*. This lever *d*, which is fulcrumed at X, is joined at *u* to a rod *q*, on which at predetermined points are secured adjustable stops *t t*′, which make contact, each in its turn, with the finger *e*, fastened to the carriage E.

A toothed rack J, fastened to the carriage at one end loosely by a pin *j* (see Fig. 8) and working through a guide-opening in the cross-rib *j*′ at the end of the trough-shaped head C, engages with the pinion *b*′, whose movements are thus transmitted to the carriage.

The trough-shaped head C is provided with

a wing or lateral platform I, on which, by means of channel-bars, is formed a longitudinal groove g and a transverse groove g', communicating with the groove g at the front end of the latter. In the grooves works a pin f, (see Fig. 7,) mounted on an eccentric which can be turned in an eye of the attachment L to the work-holder K by a suitable key. The groove g is for one part of its length inclined relatively to the plane of rotation of the grinder, so that the pin f in running along this part of said groove shifts the work-holder crosswise of the carriage E, and thus shifts the points at which the grinder touches the work across the face of said grinder, so that this is worn away and caused to operate with regularity. By turning in its seat the eccentric which carries the pin f the position of these work-touching points relatively to their planes of rotation is also changed.

When the articles to be ground have on top a longitudinally-curved form, it suffices to give to the rails r the same curvature, in order to obtain a direct grinding in conformity with such shape, but when the articles to be ground have their faces slightly curved and present inequalities in thickness the rails r remain straight, but the objects to be ground are placed on elastic supports, which can consist of simple caoutchouc blocks, but which are generally made as indicated in Fig. 4, the cleats or retainers s, whose upper faces are arranged to receive and uphold the articles by their perimeters, being mounted on an elastic seat formed by a spring. The degree of pressure of the articles against the stone can be rendered sensibly constant either by giving sufficient length to the springs or by using instead levers which support the retainers s at one end and are weighted at the other.

The machines may be simple or double, and the powders produced by the operation can be drawn off and carried away by a fan, as heretofore practiced in machines of the same class, grinding dry or wet.

The operation is as follows: The trough-shaped head C being put and secured in place at the desired height and the table p, while at its front position, being supplied with the articles to be ground, the grindstone is started, if not already running, and at the same time the cone c or c', whichever rotates from pinion b' in the direction to advance the carriage under the stone B, is engaged by means of the lever d. Correspondingly with the advance of the carriage E the work-holder K, and consequently also the table p, is shifted laterally a certain amount under the action on the pin f of the inclined portion of the groove g. The stop z prevents any of the articles being forced back by the biting action of the grindstone. When the point is reached at which the carriage should stop, the finger e strikes the stop t' and releases the cone c or c' which has been engaged. Then by means of the lever d the other cone is engaged, the pinion b' at once turns in the opposite direction, and the carriage returns to the front, its travel being arrested when the finger e strikes the stop t, at which time the pin f will be opposite the groove g'. The workman then draws aside the work-holder K and its table p, (the pin f entering the groove g',) and he can now turn or replace the metal articles while outside the plane of rotation of the grindstone without any exposure to danger therefrom. The articles being again in place, the work-holder K is pushed back in front of the grinder and then under the same by shifting the lever d so as to engage the first cone, and so on.

It will be seen that the grindstone B, mounted on its arbor in the ordinary manner, has no motion other than its rotation, and its operation is thus rendered more sure than if while turning it had to be shifted vertically or laterally, and thereby made liable to spring or vibrate, not without a real danger of rupture. It will also be seen that the head is so arranged that the carriage which it carries is automatically stopped at each end of its course, that the articles worked in accordance with their form or elastically supported are likewise brought to the desired height, that these articles are shifted transversely in traveling under the grinder and also when the carriage is at its starting-point, and, lastly, that the surveillance and manipulation of the said articles do not oblige the workman to expose himself in front of the stone.

I claim as my invention or discovery—

1. In a machine for grinding metal articles, such as files, leaves of springs and other objects of ironwork, a work-holding apparatus in which are combined a trough-shaped head adjustable vertically by a screw and provided with a stem which fits in a sleeve secured to the machine-frame, removable rails arranged at the bottom of the trough, a carriage running on said rails and arranged to support a transversely-movable work-holder, and a work-holder having a rib around its upper surface and provided with a work-supporting plate or work-supporting elastic blocks, and also having a pin for shifting the work-holder mounted on an eccentric which turns in an eye in a lateral extension of said work-holder, said pin projecting into an inclined longitudinal groove for shifting said work-holder laterally during the travel of said carriage and being arranged to enter a lateral groove for withdrawing the work-holder from in front of the grinder when the carriage is at the end of its course, substantially as described.

2. In the head of a work-holding apparatus and in combination with a carriage, and a work-holder carrying work-supporting plates or retainers and movable longitudinally and transversely under the grinder as hereinabove specified, a shaft mounted in bearings on said head, a pinion fast on said shaft, friction-

cones connected with each other and engaging said shaft by a spline so as to be movable longitudinally, a rack connected with said carriage and engaging said pinion, loose pulleys turning in opposite directions and having their rims extended over the said cones respectively, a cone-shifting lever, and a rod connected with said lever and provided with stops, arranged to be struck by a finger on said carriage, substantially as described.

3. In a grinding-machine, the combination with a longitudinally-movable carriage and means for imparting said longitudinal movement thereto, of a transversely-movable work-holder, means for imparting to the work-holder said transverse movement during the longitudinal reciprocation of the carriage, and means for transversely adjusting the position of the work-holder independent of its transverse reciprocating movement, substantially as described.

4. The combination with the head provided with a longitudinal and a transverse groove opening into each other, of the carriage traveling lengthwise of said head, and the tool-holder mounted on said carriage in transverse ways and provided with a pin arranged to travel in said grooves, substantially as described.

5. The combination with the head provided with a groove, of the longitudinally-moving carriage, and the tool-holder mounted on said carriage in transverse ways and provided with a pin set in an eccentrically-turning device and arranged to project into said groove, substantially as described.

6. In combination with the rotary grinder, a work-holding apparatus, consisting of a trough-shaped head adjustable vertically and having a stem which enters a sleeve secured to the frame of the grinding-machine, a carriage traveling longitudinally of said head, a tool-holder mounted on said carriage in transverse ways, and the means for imparting lateral movement to said tool-holder, substantially as described.

7. In combination with a rotary grinder, a work-holding apparatus, consisting of a trough-shaped head adjustable vertically and having a stem which enters a sleeve secured to the frame of the grinding-machine, a carriage traveling longitudinally of said head, a tool-holder mounted on said carriage in transverse ways, the means for moving said carriage back and forth, the hand-lever for putting said means into action, and the stops arranged in the path of a finger on said carriage and connected with said lever so that the carriage is arrested on contact of either stop with said finger, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

ADOLPHE ESPINASSE.

Witnesses:
LOUIS GALLARD,
EDWARD BEUGNIOT.