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F. W. GREEN

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WORK SUPPORTING FIXTURE

Filed June 5, 1929

2 Sheets-Sheet 1

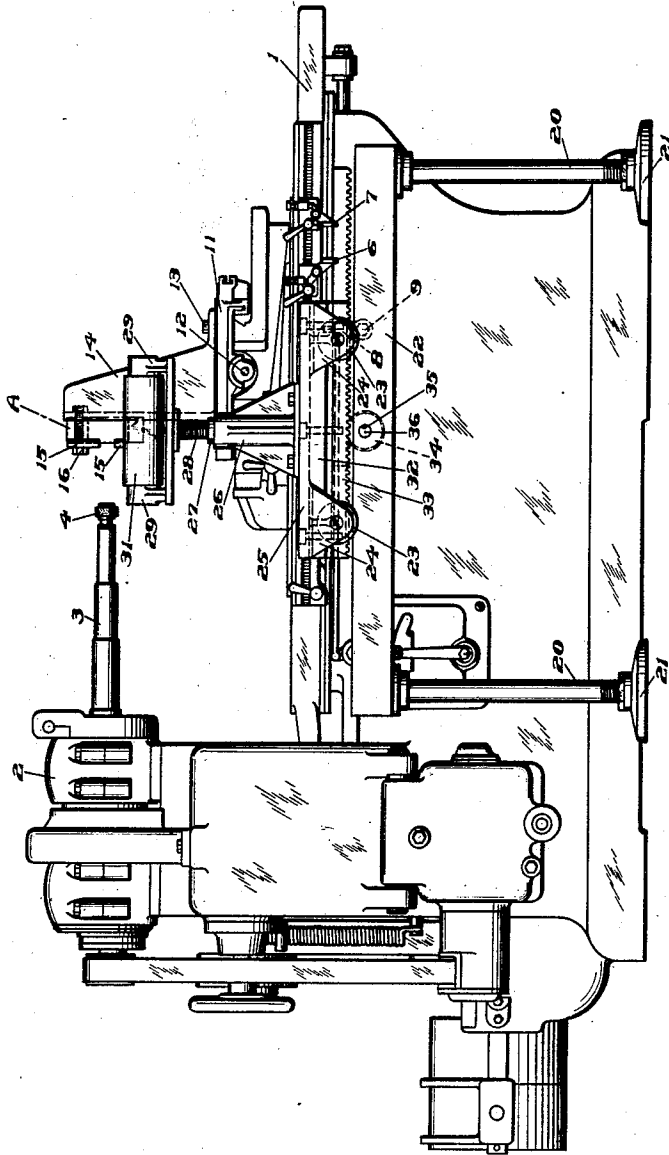


Fig. 1

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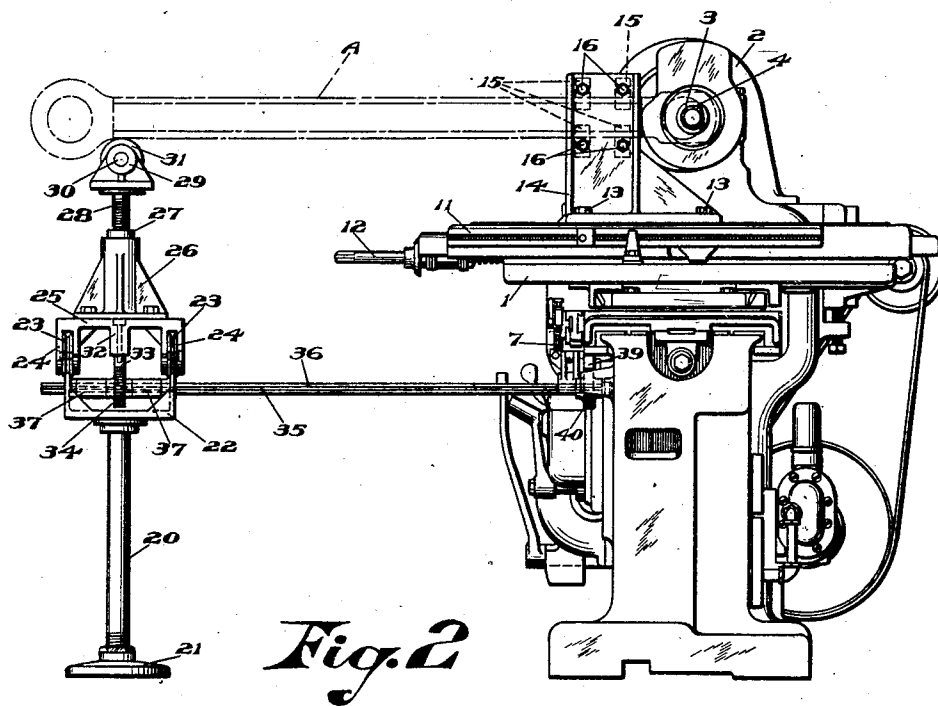


Fig. 2

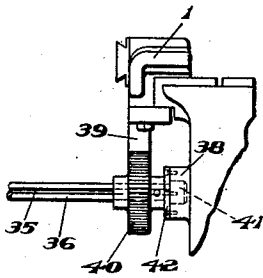


Fig. 3

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UNITED STATES PATENT OFFICE

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WORK SUPPORTING FIXTURE

Application filed June 5, 1929. Serial No. 368,637.

The present invention relates to a work-supporting fixture, for use with a grinding machine, or other machine tool, when operation of the latter requires reciprocation of heavy work, of such size as to project beyond and overhang the reciprocatory table or carriage of the machine.

It has been proposed heretofore to provide an auxiliary support for such work, in spaced relation to the machine table, the reciprocation of the latter being communicated to the auxiliary support through a span member connected to each of said parts; such a fixture is shown and described in U. S. Letters Patent of Yerk et al. No. 1,658,826 dated February 14, 1928.

The present invention contemplates improvements in a supporting fixture of the type disclosed by said Yerk et al. patent, by way of securing the reciprocation of the auxiliary support without resort to a span member connecting said support to the reciprocating machine table, and in the absence of the binding or distortion that inevitably results from the use of such a span member. Other and further objects and advantages of the invention will hereinafter more fully appear from the following detailed description, taken in connection with the accompanying drawings, in which:—

Fig. 1 is a front elevation of a grinding machine provided with a work-supporting fixture constructed according to the invention.

Fig. 2 is an end elevation of the grinding machine and work-supporting fixture.

Fig. 3 is an enlarged fragmentary view taken from the right hand side of Fig. 1.

Like reference characters refer to like parts throughout the drawings.

Referring first to Fig. 1, the grinding machines in connection with which the supporting fixture of the invention is disclosed, comprises a table or carriage 1, which is mounted to reciprocate on ways, not shown, provided by the base of the machine. The grinding machine provides a wheelhead 2 in which is journaled a spindle 3, the latter carrying a grinding wheel 4. The spindle and grinding wheel are rotated rapidly about the common axis, and at the same time this axis is

rotated in an orbital path about the axis of a hole or bore in the workpiece A which is to be enlarged and finished by the grinding action of wheel 4. It will be understood that said workpiece A, carried by the table 1 of the machine, must be reciprocated, in order to subject the entire length of its bore to the action of the rotating and orbitally moving grinding wheel 4.

The carriage 1 is reciprocated upon the base of the machine by any suitable mechanism. As here shown a pair of reversing dogs 6 and 7 are provided, adjustably mounted on the carriage;—they are adapted to engage an interposed reversing lever 8 which is pivotally mounted at 9 on the base of the machine, and by alternately shifting this lever back and forth, they procure the reversal in direction of travel of the carriage 1. The particular means which is employed to effect this reversal is immaterial, since many forms of reciprocating and reversing mechanism are known to the art, but for the manner in which the shifting of the lever 8 may procure the reversal of the carriage movement, reference may be had to U. S. Letters Patent No. 1,582,468, issued April 27, 1926.

A cross slide 11 is mounted upon the reciprocating carriage 1 and the machine provides any suitable means, such as a screw shaft 12, for feeding the cross slide transversely, thereby to maintain contact of the workpiece bore with the grinding wheel 4. Secured to the cross slide 11 as by means of bolts 13, 13 is a standard 14, which provides four clamps 15 on its left hand face; these clamps are held in place by means of bolts 16.

The workpiece A, which is here shown as a side rod for a locomotive, is adapted to be held by these clamps, the latter engaging the work A in the vicinity of the bore therein to be ground by wheel 4, so that the axis of said bore corresponds to the axis of orbital movement of said wheel. In this position of the work A, as shown in Fig. 2, the major portion of said work overhangs the grinding machine, and obviously, unless the projecting outer end of said work is suitably supported, so as to prevent undue vibration when the work is reciprocated, as above described, the grinding

operation on the hole or bore of said work cannot be accurately performed.

The supporting fixture of my invention comprises a pair of pedestals 20, 20, having large bases 21, 21, said pedestals supporting a generally rectangular frame 22 which is U-shaped in cross section or end view as shown in Fig. 2. The opposite sides of the U-shaped frame 22 serve as rails to support two pairs of grooved wheels 23 which are journaled in depending forked portions 24 provided by a carriage 25. The carriage 25 has bolted to the top thereof a pedestal 26 which has an internally threaded cylindrical portion 27 that extends vertically and within which is received a screw threaded shaft 28 upon the top of which are integrally secured a pair of end bearings 29, 29 which receive trunnions 30 provided by a roller 31. The roller provides a support for the outer end of the side rod A or other workpiece, allowing it to move slightly in a longitudinal direction without any friction due to expansion or contraction from change of temperature or any other cause, yet offering sufficient resistance to lateral movement.

My invention contemplates the movement of the carriage 25 synchronously with the table or carriage 1. To that end a downwardly extending portion 32 provided in the center of the under portion of the carriage 25 has fastened thereto a rack 33, which meshes with a gear 34 that provides a key fitting in a spline 35 provided in a horizontal shaft 36. The shaft 36 extends through bearings 37, 37 provided by the sides of the stationary U-shaped frame or support 22, and the shaft 36, at its other end, is received in an end bearing 38 provided on the front of the frame of the grinding machine. This is best shown in Fig. 3. As shown in said figure, a rack rod 39 is attached to the front of the carriage 1 and depends downwardly from it; said rack rod is in engagement with a gear 40 which is fastened to the shaft 36. Since the gears 40 and 34 are of the same diameter, it follows that the revolution imparted to the gear 40 by movement of the table 1, will be transmitted to the carriage 25, which will therefore move at the same speed, through the same distance and be reversed at the same time as the table 1.

It is obvious that the whole unit comprising the pedestals 20, 20, the frame 22, and the carriage 25 may be moved toward and away from the grinding machine by reason of the key and spline connection between shaft 36 and the gear 34. To prevent the shaft 36 from pulling away from its bearing 38, an enlarged portion 41 is provided on the end of said shaft, a cover plate 42 being used to retain it in place.

The bearings 37, 37 of frame 22 can slide endwise on the shaft 36, thus permitting said frame to be positioned at any desired dis-

tance from the grinding machine for the proper support of a workpiece A by the carriage 25.

In employing the supporting fixture of the invention, the pedestals 20, 20 and frame 22 together with the carriage 25 are first located in the correct position so as to support the outer end of the workpiece. The unit comprising the bearing supports 29, 29 and shaft 28 is then rotated until the roller 31 is at the desired height whereupon the workpiece A is placed upon the workpiece roller, and clamped into the workpiece stand 14 by means of the clamps 15 and bolts 16. It will be apparent that a heavy workpiece A can be placed in position for clamping much more easily with the aid of the roller 31, than heretofore, for it may literally be rolled into position, and the operator is not under the necessity of holding the outer end of the workpiece while clamping it. Thus the apparatus of the invention is useful as a workpiece loading means as well as serving to prevent vibration by supporting and reciprocating the outer end of the workpiece.

I claim:

1. In apparatus of the class described, a work support, a carriage to said work support, a channel shaped member whose edges provide tracks for supporting and guiding said carriage, a rack on said carriage, a shaft, a gear slidably mounted on but rotatable with said shaft, and in mesh with said rack, a second gear mounted on said shaft to rotate it, and means to rotate said second gear.

2. Supporting means for work carried in overhanging relation by the reciprocatory table of a grinding machine or the like, comprising a supporting frame, a carriage adapted to travel on said frame in substantial parallelism with the travel of said reciprocatory table, a rack on said carriage, a shaft journaled in said frame and rotated in opposite directions by the reciprocations of said table, and a gear on said shaft in mesh with the rack of said carriage, to procure the latter's reciprocation, in unison with that of said table.

3. Supporting means for work carried in overhanging relation by the reciprocatory table of a machine tool, comprising a supporting frame, providing spaced rails substantially parallel with the travel of said table, a carriage for the support of the overhanging work, said carriage being mounted for rolling movement on said rails, a rack on said carriage, a shaft journaled in said frame and deriving rotation first in one direction and then in the other from the reciprocations of said table, and a gear on said shaft in mesh with said rack, to effect the reciprocation of said carriage in unison with the reciprocation of said table.

4. Supporting means for work carried in

overhanging relation by the reciprocatory table of a machine tool, comprising a supporting frame in spaced relation to said machine tool, a carriage movable on said frame in supporting relation to the overhanging portion of said work, a rack on said carriage, a shaft deriving rotation, first in one direction and then in the other from the reciprocation of said table, said shaft having journals in said frame that permit shifting of the latter, lengthwise of said shaft, to vary the distance by which said frame is spaced from said machine tool, and a gear on said shaft, movable lengthwise thereof, to mesh with the rack of said carriage, thereby to procure the latter's reciprocation in unison with the reciprocation of said table.

5. Supporting means for work carried in overhanging relation by the reciprocatory table of a machine tool, comprising a supporting frame, a work-supporting carriage adapted to travel on said frame, a rack on said carriage, a shaft journaled in said frame, a gear on said shaft adapted to mesh with a rack on the machine table, and a second gear on said shaft in mesh with the rack of said carriage.

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