No. 818,423. PATENTED APR. 24, 1906.

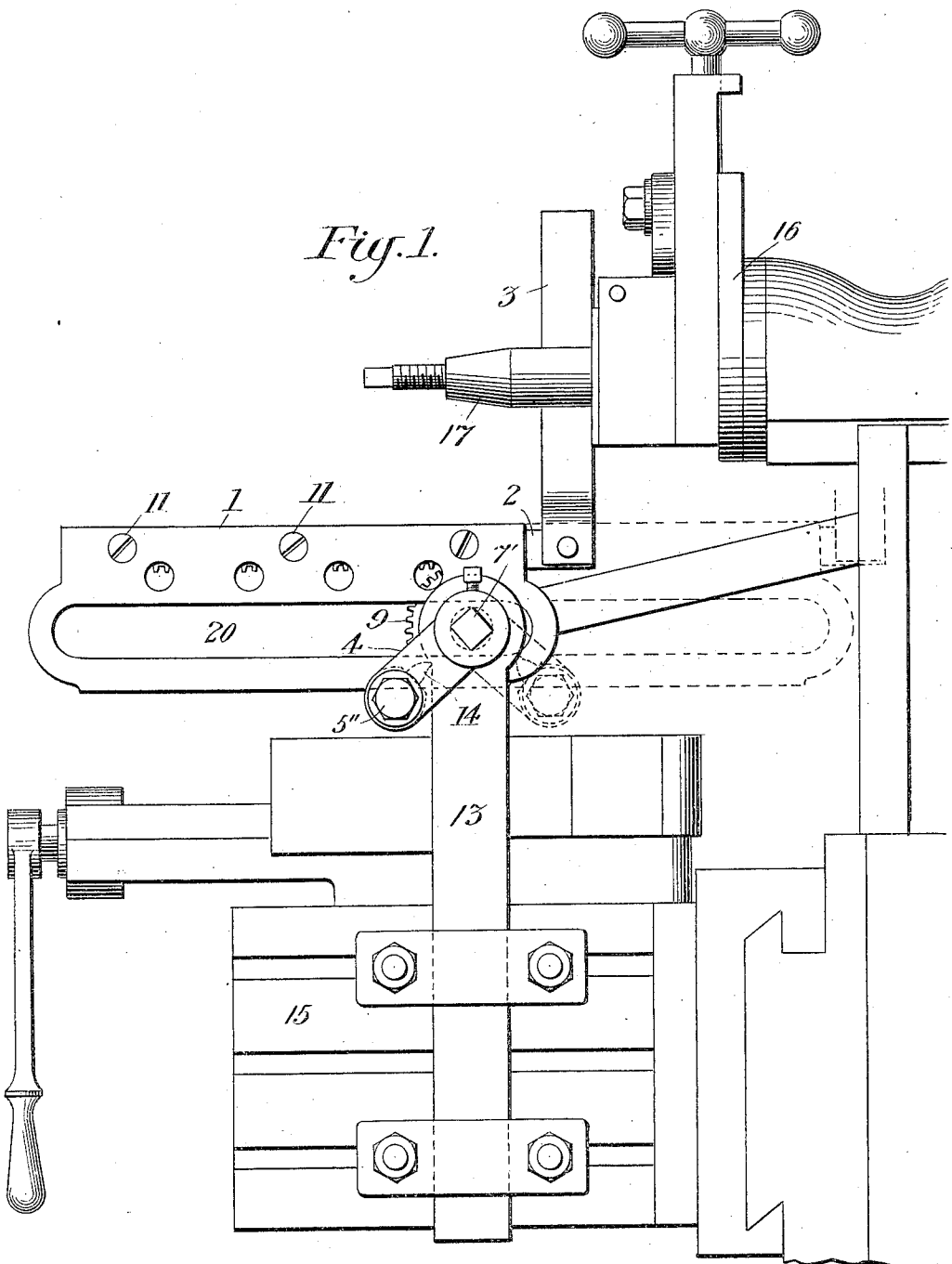
H. DUNN.

ATTACHMENT FOR SHAPERS FOR MAKING CURVED SURFACES.

APPLICATION FILED AUG. 12, 1905.

3 SHEETS—SHEET 1.

Fig. 1.



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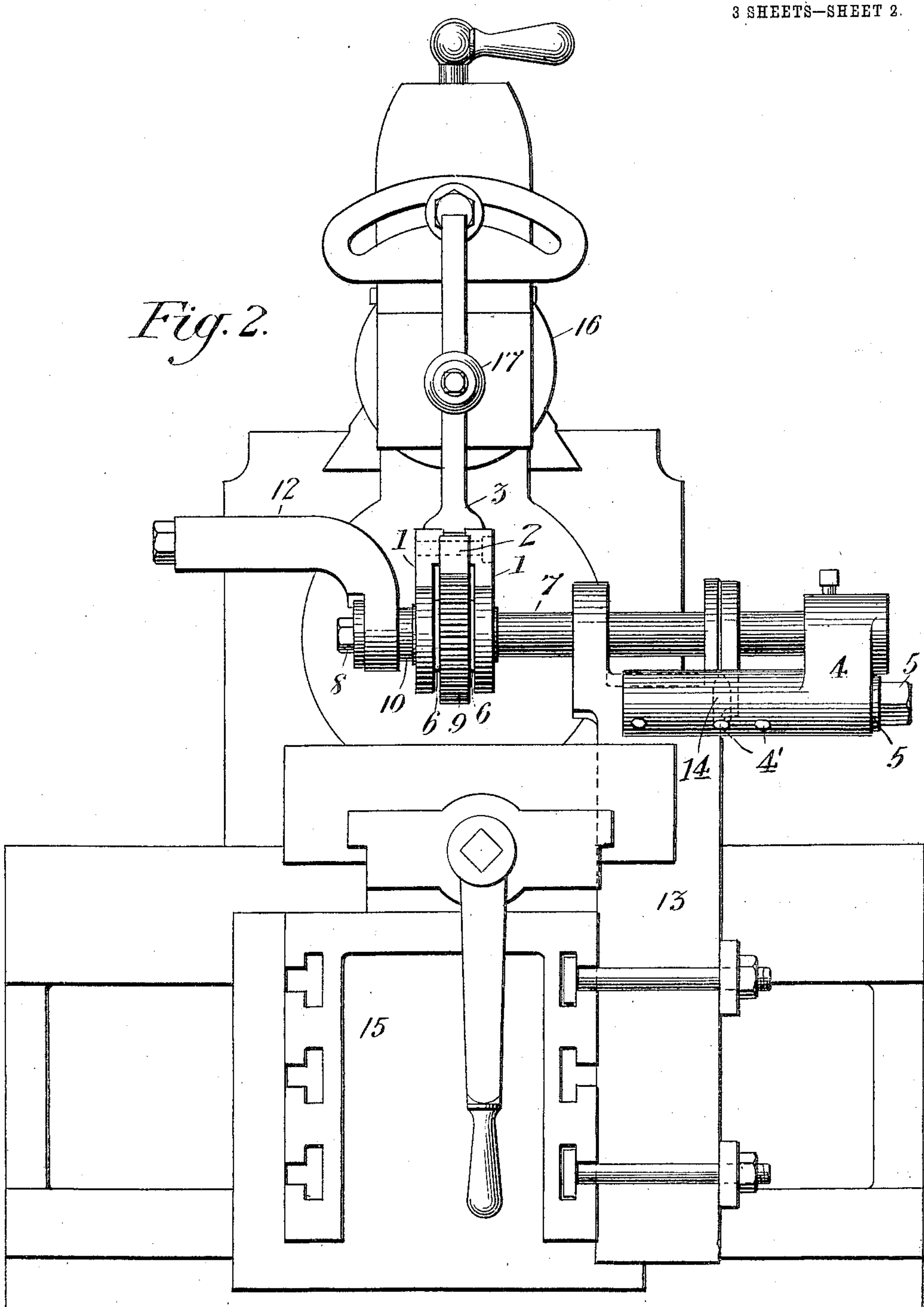
3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 3.

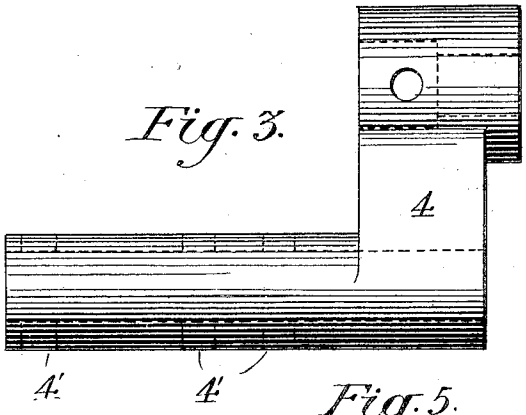


Fig. 4.

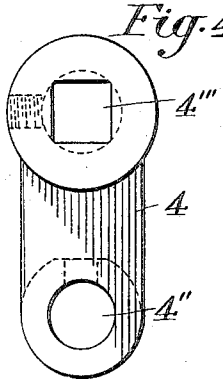


Fig. 5.

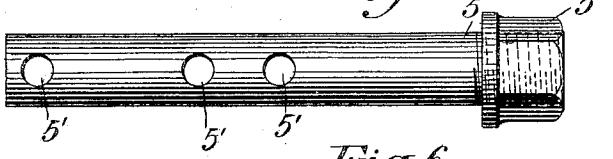


Fig. 6.

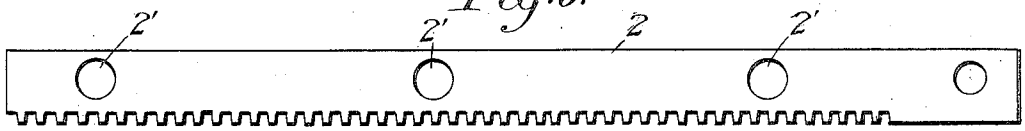


Fig. 7.

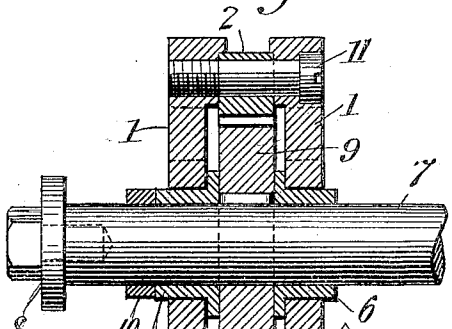
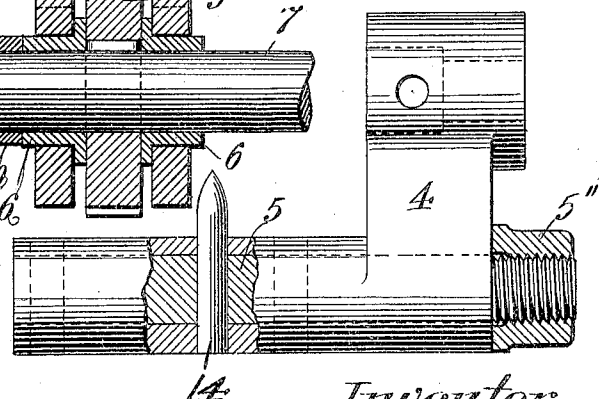


Fig. 8.



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UNITED STATES PATENT OFFICE.

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ATTACHMENT FOR SHAPERS FOR MAKING CURVED SURFACES.

No. 818,423. Specification of Letters Patent. Patented April 24, 1906.

Application filed August 12, 1905. Serial No. 274,009.

To all whom it may concern:

Be it known that I, HORACE DUNN, a citizen of the United States, residing at Cleveland, county of Cuyahoga, State of Ohio, have invented certain new and useful Improvements in Attachments for Shapers for Making Curved Surfaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to a certain new and useful attachment for shapers by means of which curved surfaces may be produced on a piece of work secured to the shaper-table, and to this end comprises a shaft or spindle mounted between the shaper-head and the bed of the machine, which shaft carries a tool-holder in which the tool for making the cut on the work is adjustably mounted, and means connected with the shaper-head to impart rotary motion to said shaft, so that as said shaper-head slides back and forth, as in the ordinary course of its operation, the shaft and the tool-holder carried thereby will be given an oscillatory motion with respect to the portion of the work to be operated upon, so that in one direction of the motion of said tool-holder the tool will turn off a chip or cut from the work and in its continued operation produce on the work the rounded or curved surface desired.

In the accompanying drawings, Figure 1 is a side elevation of the front end of an ordinary shaper having my invention applied thereto. Fig. 2 is a front elevation thereof. Figs. 3 and 4 are a front and end elevation, respectively, of a preferred form of tool-holder. Fig. 5 is a detail of a tool-clamping bar coöperating with the tool-holder. Fig. 6 is a detail view of a rack by means of which the tool-holding shaft is operatively connected with the shaper-head. Fig. 7 is a longitudinal section through the operating means for the shaft or spindle; and Fig. 8 is a front elevation of the tool-holder, parts thereof being shown in section to illustrate the mode of securing the tool in place.

Referring to the drawings, 15 indicates the bed of a shaper of the usual well-known type, and 16 indicates the shaper-head, which is provided with the usual form of tool-rest 17, in which the cutting-tool of the shaper is ordinarily secured. It will be understood that in machines of this character the work is clamped to the bed of the shaper either upon its top surface or one of the lateral surfaces and the cutting-tool supported in the head 16 is moved backward and forward as said head reciprocates to take successive cuts from the surface of the work on the table. It will be further understood that the bed is capable of suitable vertical and transverse adjustment and that the portion of the head which supports the tool-rest is likewise capable of proper vertical and angular adjustment to properly present the tool for taking straight cuts from the surface of the work.

Heretofore machines of this class have never been employed to produce curved surfaces where such are required upon the work, for the reason that the machine has been considered as adaptable only to straight work. For example, in working up parts of machinery—such as pitmen, cross-heads, clevises, and the like—in which certain portions only required a true circular finish it has been found necessary to employ six or more distinct operations to finish one piece, including planing and filing. By the application of the present invention to a shaper of the ordinary type such work as that just referred to can be completed in two operations—to wit, the ordinary shaping operation or the straight parts of the work and the turning of the curved parts of the work—by the attachment of the invention covered hereby to the shaper, as will be more particularly described hereinafter.

In Figs. 1 and 2 of the drawings, 1 indicates a slide consisting of two face-plates having longitudinal slots 20 along their lower portions. Between the face-plates of the slide 1 is secured a rack 2, connected to the face-plates to form a rigid structure threwith by through-bolts 11, as more particularly illustrated in Fig. 7. The end of the rack 2 is connected by pivoted link 3 with the tool-rest 17 of the shaper-head 16, said link 3 fitting the tool-rest and being clamped thereto by the usual set-screw in practically the same manner that the ordinary shaper-tool is.

Journaled at one end in a bracket or steady-bar 12, secured to the stationary machine-frame, is a spindle or shaft 7. Between the face-plates of the slide 1 and in position

to be engaged by the rack 2 is a spur-gear 9, by means of which rotatory motion in alternate directions is imparted to said shaft as the rack is reciprocated by the corresponding motion of the shaper-head. In order to hold the gear 9 in proper relation to mesh with the rack at all points of its travel and to serve as guides for the slide, suitable collars or slide-bearings 6 are mounted upon the shaft at each side of the gear 9 and are provided with peripheral flanges lying between the respective sides of the gear and the adjacent walls of the slide 1. A distance-piece or washer 10 is located on the shaft between the end slide-bearing 6 and the bracket 12 to insure the proper relation of the rack and gear in substantial alinement with the movement of the shaper-head. The shaft is secured in the bracket or steady-bar by means of a suitable set-screw 8. The bearing for the other end of the spindle or shaft 7 is preferably provided by the work to be operated upon, said shaft for this purpose passing through a hole in the work, which is the usual concomitant of the curved surface to be operated upon—as, for example, in the knuckle-joint piece, (indicated at 13 in Figs. 1 and 2,) the upper portion of which is provided with a forked end, the outside edges of which are to be given a true circular finish in order to properly mesh with the mating element of the knuckle-joint. In order to center and properly support the shaft 7 in the hole of the work, suitable washers or distance-pieces may be employed to accurately fill the space between the shaft and the inside surfaces of the hole or holes in the work.

The end of the shaft 7 is preferably squared, as at 7′, to receive the tool-holder, which in the ordinary form of the invention comprises a crank-shaped piece 4, secured to the shaft by a suitable set-screw or similar means and having its longitudinal arm bored to receive a locking-pin 5. Both the longitudinal arm of the tool-holder and the locking-pin are provided with registering holes or orifices 4′ 5′ to permit the tool 14 to be adjusted to different positions in the tool-holder. In order to lock the tool securely in the holder, the pin 5 is provided at its outer end with a screw-thread which receives a nut 5″, by means of which said pin 5 is moved backward and forward within the longitudinal arm of the tool-holder to clamp the tool in position.

The operation of the invention as hereinbefore described in connection with the shaper is substantially as follows: The shaft 7 is secured in position upon the frame of the shaper by means of the bracket or steady-bar 12, which of course is removably attached to the machine-frame. The link 3 is at the same time secured in the tool-rest 17 in such position as to insure the proper reciprocation of the rack 2 to impart rotary motion to the gear 9 and thence to the shaft 7. The work to be operated upon is then clamped to position upon the machine-bed, the latter being suitably adjusted for this purpose, so as to bring the hole in the work into coaxial alinement with the shaft 7 and to form the outboard-bearing for said shaft when the washers or distance-pieces to fill up the space between the shaft and the interior walls of the hole or holes in the work are applied. The tool is then inserted in the proper hole or socket in the tool-holder 4 to bring it into the desired position to engage the portion of the work which is to be finished with a curved surface, after which the tool is secured and locked by setting up the nut 5″ on the locking-pin 5. The shaper is now started up, and the reciprocation of the head 16 causes the slide 1 and rack 2 to move in the same direction and to the same extent as said head. This reciprocatory motion of the rack causes the spur-gear 9 and the shaft 7 to oscillate, which swings the tool-holder 4 and the tool carried thereby in a circular path about the portion of the work to be operated upon. The forward motion of the tool takes the necessary cut or chip from the surface of the work. The reverse movement simply causes it to slide idly over the work in the path of the cut just taken. As the stroke of any ordinary shaper-head may be varied at will and as the table or bed is likewise provided with a slide and feeding mechanism, it will be apparent that the circular stroke of the tool-holder may be correspondingly varied by suitably adjusting the stroke of the shaper-head and that the feeding of the work for successive cuts may be accomplished by the ordinary adjustments of the bed or table. By this means any part of a complete circle may be turned upon the work and the diameter of the circle, as well as the extent of the surface operated upon, may be varied within the limits of the length of the longitudinal arm of the tool-holder 4 and the radius of the curved arm of said holder.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An attachment for shapers for producing curved surfaces on the work secured to the shaper-bed, comprising a shaft mounted between the shaper-head and the bed of the machine, a tool-holder on said shaft, and means connected with the shaper-head to impart rotary motion to said shaft.

2. An attachment for shapers for producing curved surfaces on the work secured to the shaper-bed, comprising a shaft mounted between the shaper-head and the bed of the machine, a tool-holder on said shaft, a gear on said shaft, and a rack connected with the shaper-head and meshing with said gear to rotate said shaft.

3. An attachment for shapers for producing curved surfaces on the work secured to

the shaper-bed, comprising a shaft mounted between the shaper-head and the bed of the machine, a tool-holder on said shaft, a gear on said shaft, a rack connected with the shaper-head and meshing with said gear to rotate said shaft, and a guide-frame attached to said rack and embracing said shaft.

4. An attachment for shapers for producing curved surfaces on the work secured to the shaper-bed, comprising a shaft mounted between the shaper-head and the bed of the machine, a crank-shaped tool-holder secured on said shaft, and means connected with the shaper-head to impart rotary motion to said shaft and tool-holder.

5. An attachment for shapers for producing curved surfaces on the work secured to the shaper-bed, comprising a shaft journaled at one end in a bracket removably secured to the machine-frame, a tool-holder on said shaft, and means connected with the shaper-head to impart rotary motion to said shaft and tool-holder.

6. An attachment for shapers for producing curved surfaces on the work secured to the shaper-bed, comprising a shaft journaled at one end in a bracket removably secured to the machine-frame, a tool-holder on said shaft, a gear on said shaft, and a rack connected with the shaper-head and meshing with said gear to impart rotary motion to said shaft and tool-holder.

7. An attachment for shapers for producing curved surfaces on the work secured to the shaper-bed, comprising a shaft journaled at one end in a bracket removably secured to the machine-frame, a tool-holder on said shaft, a gear on said shaft, a rack connected with the shaper-head and meshing with said gear to impart rotary motion to said shaft and tool-holder, and a guide-frame attached to said rack and embracing said shaft.

8. An attachment for shapers for producing curved surfaces on the work secured to the shaper-bed, comprising a shaft journaled at one end in a bracket secured to the machine-frame, a tool-holder mounted on said shaft to swing around the work, means for adjustably clamping a tool in said holder, and means connected with the shaper-head to impart rotary motion to said shaft and tool-holder.

9. An attachment for shapers for producing curved surfaces on the work secured to the shaper-bed, comprising a shaft journaled at one end in a bracket secured to the machine-frame, a tool-holder mounted on said shaft to swing around the work, means for adjustably clamping a tool in said holder, a gear on said shaft, and a rack connected with the shaper-head, meshing with said gear to impart rotary motion to said shaft and tool-holder.

10. An attachment for shapers for producing curved surfaces on the work secured to the shaper-bed, comprising a shaft journaled at one end in a bracket secured to the machine-frame, a tool-holder mounted on said shaft to swing around the work, means for adjustably clamping a tool in said holder, a gear on said shaft, a rack meshing with said gear, and a link connecting the rack with the shaper-head, whereby rotary motion is imparted to said shaft and tool-holder.

In testimony whereof I affix my signature in presence of two witnesses.

HORACE DUNN.

Witnesses:
F. W. LORENZ,
JOS. H. KNUFF.