No. 744,340. PATENTED NOV. 17, 1903.

J. N. HEALD.

GRINDING ATTACHMENT FOR LATHES.

APPLICATION FILED MAR. 7, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

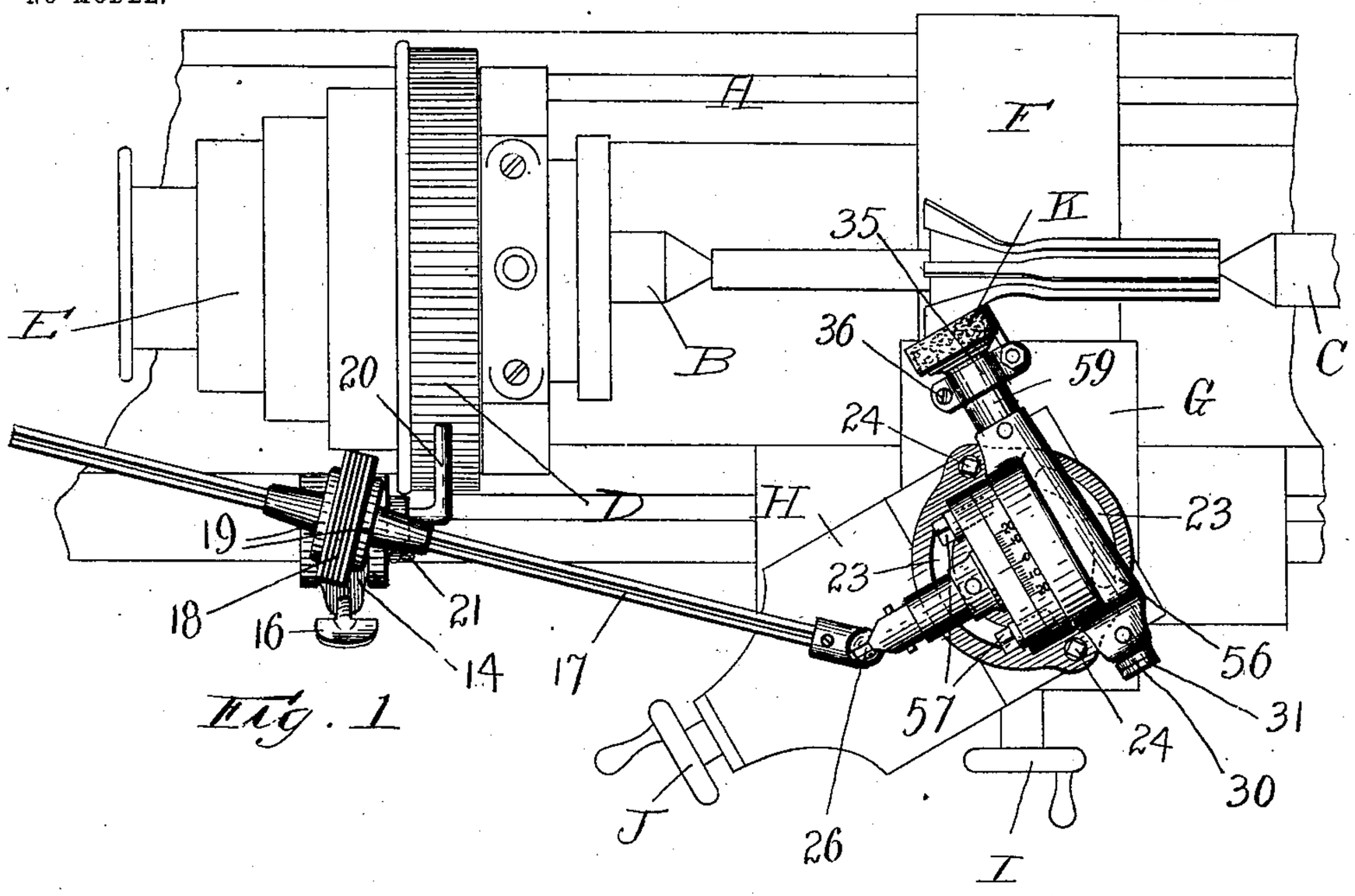

Fig. 1

Fig. 2.

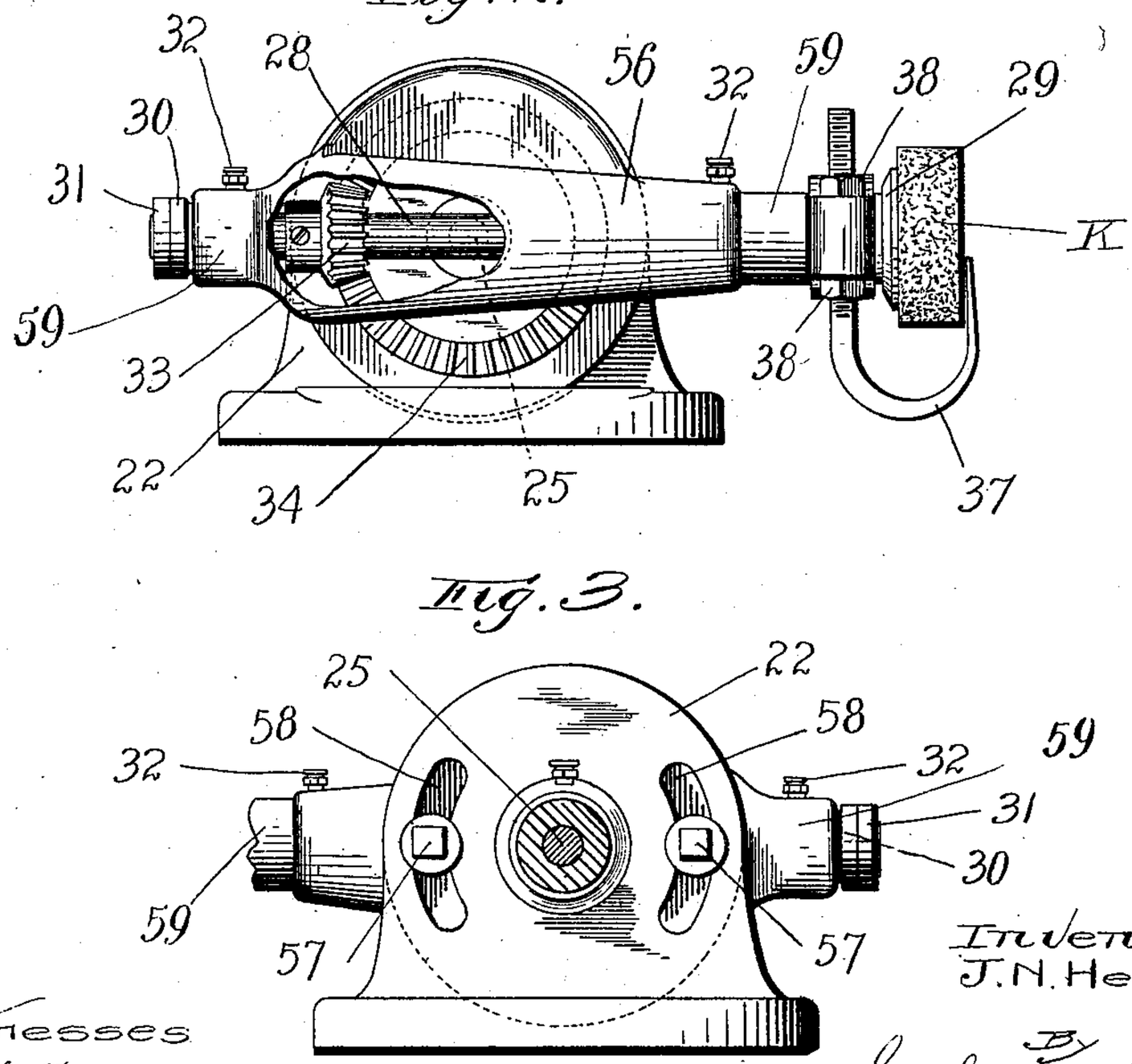

Fig. 3.

Witnesses
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NO MODEL. 2 SHEETS—SHEET 2.

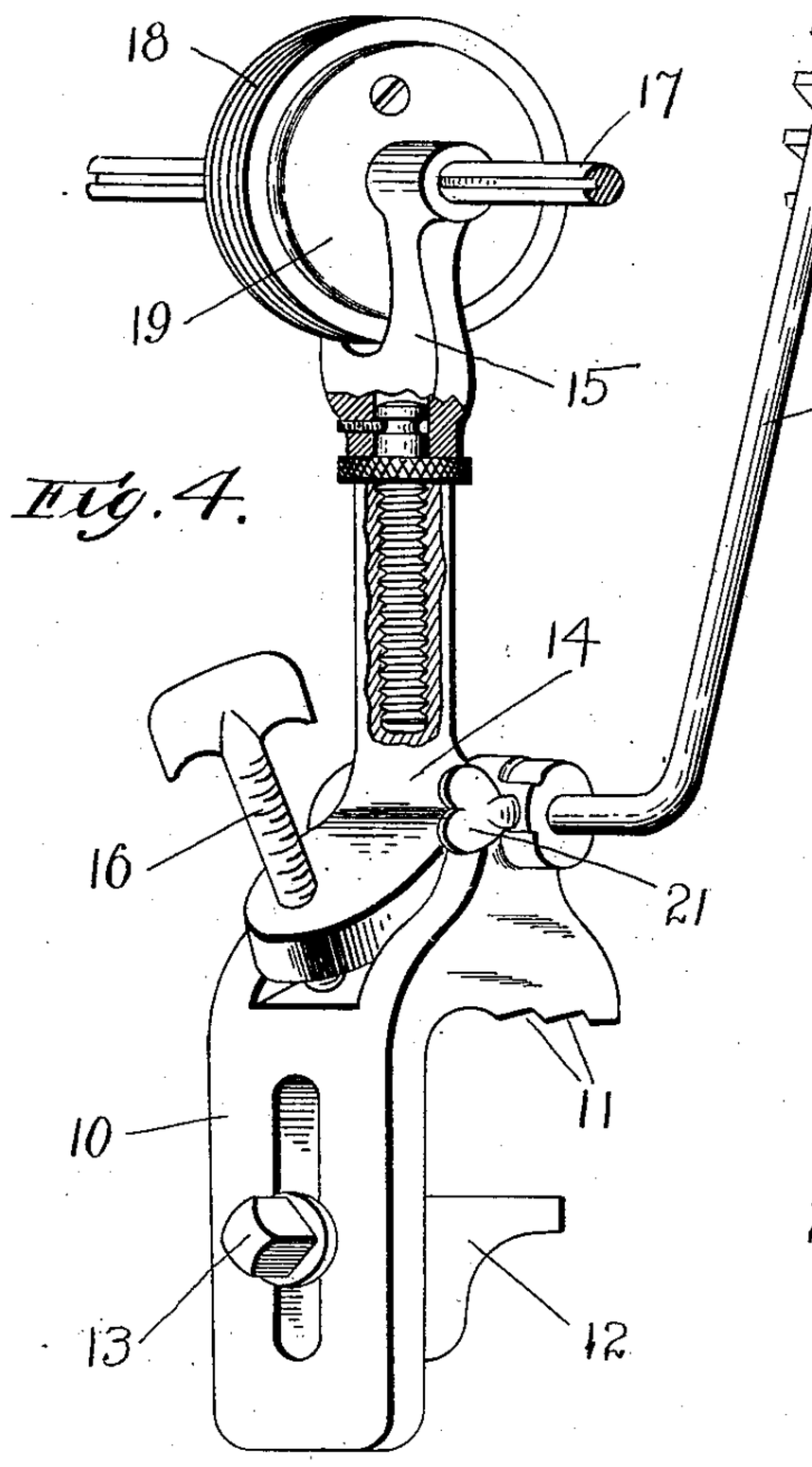


Fig. 4.

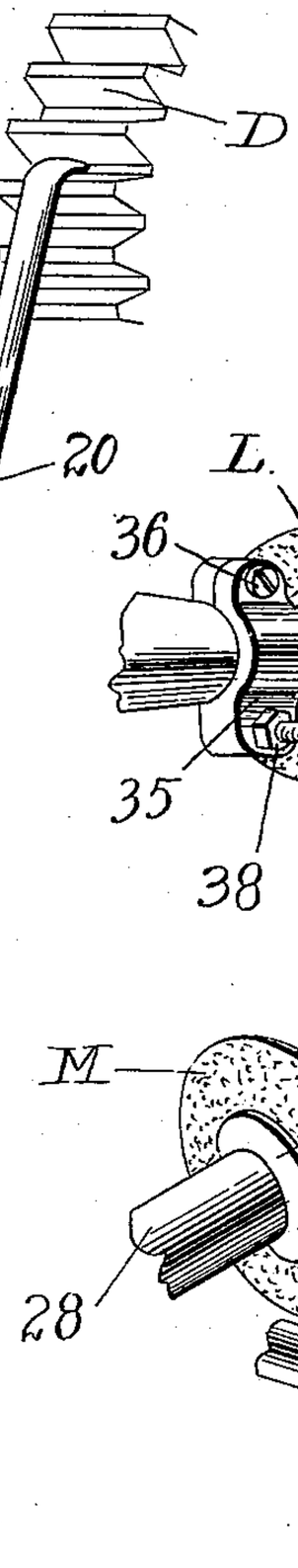
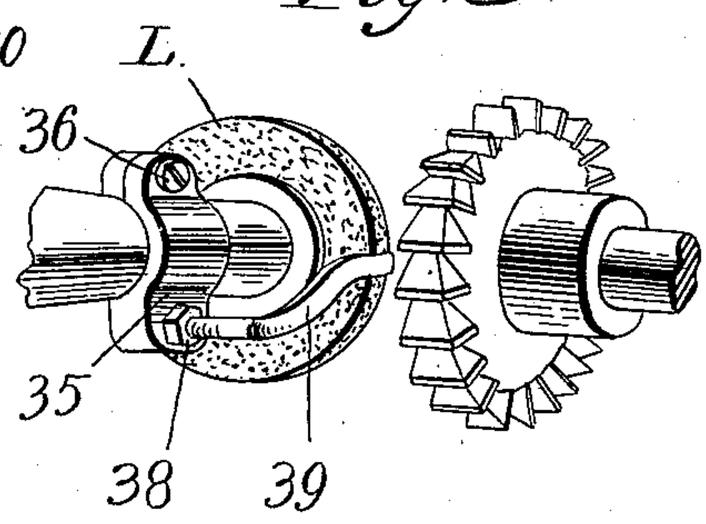


Fig. 5



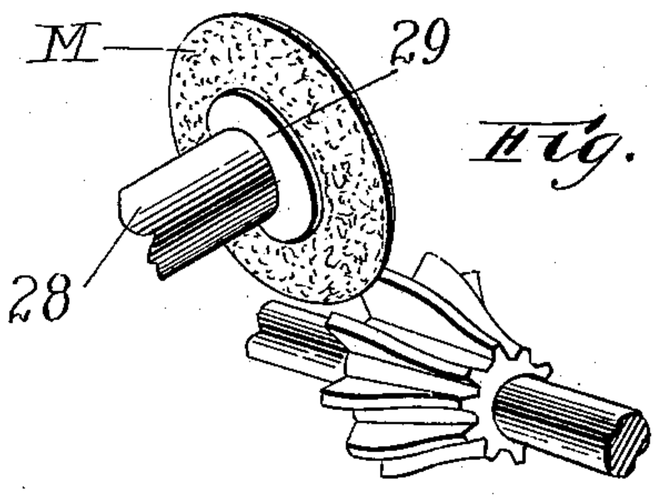


Fig. 6.

Fig. 8.

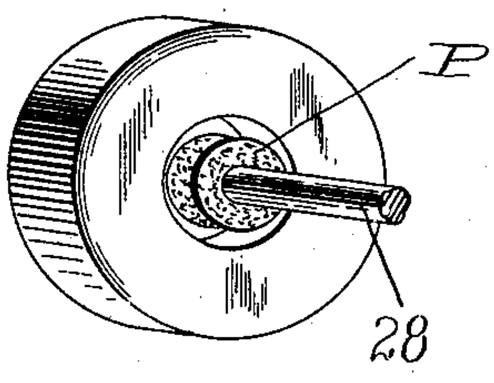
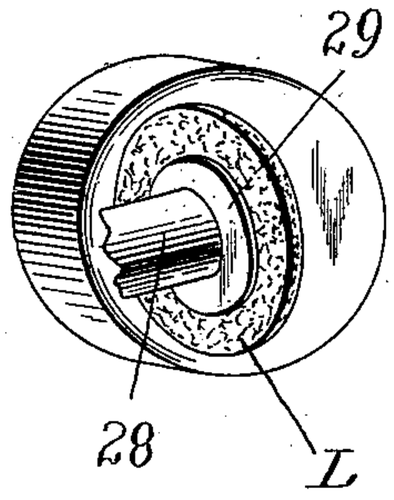


Fig. 7.



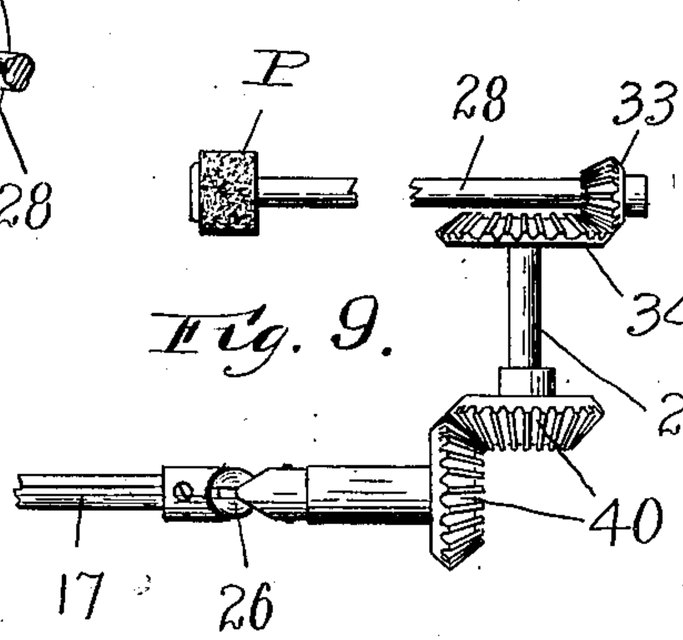


Fig. 9.

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No. 744,340. Patented November 17, 1903.

UNITED STATES PATENT OFFICE.

JAMES N. HEALD, OF BARRE, MASSACHUSETTS.

GRINDING ATTACHMENT FOR LATHES.

SPECIFICATION forming part of Letters Patent No. 744,340, dated November 17, 1903.

Application filed March 7, 1902. Serial No. 97,044. (No model.)

To all whom it may concern:

Be it known that I, JAMES N. HEALD, a citizen of the United States, residing at Barre, in the county of Worcester and State of Massachusetts, have invented a new and useful Grinding Attachment for Lathes, of which the following is a specification.

The object of this invention is to provide a strong, simple, and efficient grinding apparatus which can be readily applied to or detached from a lathe and which is adapted not only for sharpening or grinding substantially all classes of reamers and milling-cutters, but which is also adapted for nearly all classes of work which can be finished in a lathe.

To these ends this invention consists of the grinding attachment for lathes and of the combination of parts therein, as hereinafter described, and more particularly pointed out in the claims at the end of this specification.

In the accompanying two sheets of drawings, Figure 1 is a plan view of sufficient parts of a lathe to illustrate the application of my invention thereto. Fig. 2 is a rear view of that part of the construction which is carried by the tool-rest. Fig. 3 is a front view of the same partially broken away. Fig. 4 is an enlarged fragmentary perspective view, partially broken away, of the driving mechanism. Fig. 5 is a fragmentary view illustrating the position of the parts when the attachment is employed for grinding or sharpening the radial edges of a facing-cutter or similar tool. Fig. 6 is a perspective view illustrating the position of the parts when the attachment is used for facing the teeth of a special milling-cutter. Fig. 7 is a perspective view illustrating the position of the parts for grinding or truing up the face of a piece which may be held in a chuck. Fig. 8 is a perspective view showing the relation of the parts for internal grinding, and Fig. 9 is a fragmentary view illustrating the application of an additional set of bevel-gears for driving the grinding-arbor when the attachment is to be used for internal grinding.

In Fig. 1, A designates the lathe-bed; B, the live center; C, the tail-stock center; D, the head-stock gear; E, the driving-cone; F, the cross-piece of the carriage, and G and H the slides of a compound tool-rest.

The primary slide G of the compound tool-rest is movable in a straight line transversely across the lathe by means of a handle I, and the secondary slide H of the compound tool-rest may be set to different angular positions and moved in by the handle J. These parts may be of any of the ordinary or approved constructions employed in engine-lathes and need not be herein described at length.

A grinding attachment for an engine-lathe constructed according to my invention comprises a driving mechanism preferably arranged to be driven from the cone of the lathe, a grinding mechanism adapted to be secured to the tool-rest of the lathe, and a connection between the driving mechanism and the grinding mechanism.

Referring to Fig. 4 of the drawings for a detail description of the construction of driving mechanism which I preferably employ, 10 designates a bracket or casting which is provided with a number of gripping-faces 11, which faces 11 are designed to engage the shears or V-ways of a lathe. Carried by the bracket 10 is a jaw 12, which may be clamped in its adjusted position by a screw 13. The bracket 10 and jaw 12 constitute a clamp which may be secured rigidly to the bed-piece A. Pivoted in the bracket 10 is a standard or upright 14, and adjustably threaded in the standard 14 is a stud, pivotally mounted on which is a yoke 15. Journaled in the yoke 15 is a driving-shaft 17, and splined onto the driving-shaft 17 and held in place by the yoke or bearing-piece 15 is a friction-wheel 18, consisting of a number of layers of rubber, cloth, leather, or other compressible material held in place by collars 19. Threaded into a tail-piece extending from the standard 14 is a screw 16. In applying this driving mechanism to a lathe the screw-threaded stud of the yoke 15 is screwed up until the driving-shaft 17 is brought into position to stand horizontal when connected to operate the grinding mechanism, which is mounted on the tool-post of the lathe, as hereinafter described. The screw 16 is then adjusted to press the friction-wheel 18 into engagement with the

driving-cone E. The pivotal connection between the yoke 15 and the threaded stud, which carries the same, permits the yoke 15 to swivel or turn to allow a transverse motion of the grinding mechanism, as hereinafter described.

Pivoted in the bracket 10, and preferably forming the stud or bearing-piece for the upright or standard 14, is a locking arm or catch 20, which may be set into engagement with the teeth of the head-stock gear D and may be fastened in place by a thumb-screw 21, the locking-catch 20 serving to hold the live center of the lathes stationary while the grinding mechanism is driven from the driving-cone E.

The grinding mechanism, which is adapted to be secured to the tool-rest, is most clearly illustrated in Figs. 2 and 3. As shown in these figures, this grinding mechanism comprises a bracket or bearing-piece 22, which may be fastened to the tool-rest by bolts 24. The base of the bracket is preferably substantially circular and is provided with slots 23 to permit the bearing-piece to be clamped in place in different relative positions. Pivoted on the face of the bearing-piece 22 is a shell 56, which is fastened in place by bolts 57, which extend through slots 58 in the bearing-piece 22, so that the shell 56 may be turned to different relative positions.

The shell 56, as illustrated most clearly in Fig. 1, is provided with graduations or an index coöperating with a setting marked on the bearing-piece 22.

At its ends the shell 56 is provided with bearings 59, and journaled in the bearings 59 is a grinding-arbor 28, which is provided at one end with a collar or face-plate 29 for receiving an emery-wheel, and threaded onto the other end of the grinding-arbor are lock-nuts 30 and 31. The bearings of the grinding-arbor can be oiled by removing the oil-caps 32.

Secured on the grinding-arbor, as illustrated most already in Fig. 2, is a bevel-pinion 33, which meshes with and is driven from the bevel-gear 34, secured on a shaft 25, which is journaled in the pivot-piece or stud of the shell 56. The shaft 25 is connected by a universal joint 26 to the driving-shaft 17. By means of this construction by loosening the bolts 57 the shell 56 may be adjusted to support the grinding-arbor in different angular positions. The grinding mechanism may be moved either by the travel of the carriage, by the transverse motion of the primary slide G of the compound tool-rest, or by the motion of the secondary slide H of the compound tool-rest, and a great variety of grinding or finishing operations may be accomplished. The oscillation of the friction-wheel 18 and the sliding of the driving-shaft 17 through the same permit the free travel and movement of the grinding mechanism.

To adapt my grinding attachment to the accurate grinding and sharpening of reamers, milling-cutters, or similar tools, I preferably provide the same with a number of interchangeable lip-rests, by means of which the work may be properly positioned to secure any desired clearance for the teeth of the cutters. As shown in Figs. 1 and 2, a support formed by a clamp 35 is secured on the inner bearing 59 of the grinding-arbor and is fastened in place by a screw 36. At its outer side the clamp 35 is adapted to receive interchangeable lip-rests, which may be secured in place by nuts 38. For example, in Fig. 2 I have shown the form of lip-rest which may be employed when my attachment is used for grinding reamers or similar cutters. To set my grinding attachment to sharpen the teeth of cutters of this class, the shell 56 is first tipped and clamped at the proper inclination to secure the desired clearance of the teeth, the clearance which will be obtained being indicated by the index on the shell 56. The lip-rest 37 is then adjusted by means of its nuts 38 to the proper height, so that when the grinding attachment is moved in transversely the upper edge of the lip-rest will intersect the line connecting the centers of the lathe. The successive teeth of a reamer, either tapered or straight, may then be held in contact with the lip-rest 37 and the teeth ground by moving the grinding mechanism in the proper direction. For this class of work a cup-wheel K is preferably employed, as shown in Figs. 1 and 2.

In Fig. 5 I have shown the relation of the parts for grinding radial teeth. As shown in this figure, the clamp 35 is turned to a different position and a lip-rest 39, of different shape from the lip-rest 37, is set into position at the side of an edge-cutting wheel L.

To face off the teeth of milling-cutters or other tools, the grinding-arbor can be tipped up to the necessary angle and a thin face-grinding wheel M can be employed, as shown in Fig. 6.

My grinding attachment is not only specially adapted for sharpening cutters, but it may also be employed for many other classes of lathework. For example, as shown in Fig. 7, the edge-grinding wheel L may be used for facing a piece which may be carried or turned by a chuck in the ordinary manner, and when used for this purpose the locking-catch 20 will be thrown out of engagement with the head-stock gear, so as to permit the use of a chuck for carrying the work.

In some cases also my grinding attachment may be used to advantage for internal grinding. For example, as shown in Fig. 8, a small edge-cutting wheel P may be employed for grinding out a hole through a piece carried by a chuck.

In practice when my grinding attachment is to be used for internal grinding, as illustrated in Fig. 8, instead of having the driving-shaft 17 directly connected to the shaft 25 by a universal joint 26, I preferably interpose a set of bevel-gears 40 between the uni-

versal joint 26 and the driving-shaft 17, as illustrated in Fig. 9. These bevel-gears may be mounted in a shell or attachment which can be applied as a separate fixture to the grinding mechanism, and where my grinding attachment is to be used for internal grinding I consider the use of the additional set of bevel-gears 40 of advantage, not only for the reason that it permits the grinding-arbor to be more readily turned to the desired position, but also for the reason that by the use of the additional set of bevel-gears 40 I may, if desired, secure a further speeding up of the grinding-arbor, which is desirable when using a grinding-wheel P of comparatively small circumference, as illustrated in Fig. 8.

I am aware that numerous changes may be made in practicing my invention by those who are skilled in the art without departing from the scope thereof as expressed in the claims. I do not wish, therefore, to be limited to the construction I have herein shown and described; but

What I do claim, and desire to secure by Letters Patent of the United States, is—

1. In an attachment for lathes, the combination of a driving mechanism adapted to be secured to a fixed part of the lathe, and to be actuated by operative parts of the lathe, a grinding mechanism adapted to be secured to the secondary slide of a compound tool-rest, and a connection between the driving mechanism and grinding mechanism arranged to permit the grinding mechanism to be moved transversely, longitudinally, or at various angles independently of the driving mechanism.

2. In an attachment for lathes, the combination of a driving mechanism, a grinding mechanism, a connection between the driving mechanism and grinding mechanism arranged to permit the grinding mechanism to be moved to different positions, and a locking-catch for the head-stock gear of the lathe.

3. In an attachment for lathes, the combination of a bracket adapted to be secured to the lathe-bed, a locking-catch mounted in the bracket in position to engage the head-stock gear of the lathe, an upright or standard pivotally connected with the bracket by means of the locking-catch, and a friction-wheel carried by the standard in position to be driven by the driving-cone of the lathe.

4. In an attachment for lathes, the combination of a grinding mechanism adapted to be secured to the tool-rest, comprising a support, a shell pivoted on the face thereof, a grinding-arbor journaled in the shell, a bevel-pinion secured on the grinding-arbor, a bevel-gear meshing with and driving said bevel-pinion, and driving connections for operating the grinding mechanism.

5. In an attachment for lathes, the combination of a bearing piece or support, means for clamping the bearing piece or support to the tool-rest, a shell pivotally mounted on the bearing-piece, said bearing-piece and shell being provided with graduations for regulating the angle at which the grinding-wheel will be presented to the work, means for clamping the shell in its adjusted positions, a grinding-arbor journaled in the shell, a bevel-pinion secured on the grinding-arbor, a bevel-gear meshing with said pinion, and driving connections arranged to permit the grinding mechanism to be moved to different positions.

6. In an attachment for lathes, the combination of a bearing-piece adapted to be secured to the tool-rest of a lathe, a shell pivotally mounted on the face of the bearing-piece, means for clamping the shell in its adjusted position, a grinding-arbor journaled in the shell, driving connections for the grinding-arbor, and clamping-plates adjustably mounted on the shell and adapted to adjustably support interchangeable lip-rests for engaging the teeth of various cutters to present the same in proper position to be ground.

7. In a grinding attachment for lathes, the combination of a bearing-piece, means for clamping the same in different relative positions on the tool-rest of the lathe, a shell pivoted on the face of the bearing-piece, clamping-bolts extending through slots in the bearing-piece for holding the shell in different positions, a grinding-arbor journaled in the shell, a bevel-pinion fastened on the grinding-arbor, a bevel-gear meshing with said pinion, a driving-shaft having a universally-jointed connection with the bevel-gear, a friction-wheel splined on the driving-shaft, and means for adjustably supporting the friction-wheel so that its axis may be brought into proper position to allow for the swinging movement of the driving-shaft, and so that the same may be set into engagement with the driving-cone of the lathe.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JAMES N. HEALD.

Witnesses:

JOHN C. BARTHOLOMEW,

WILLIAM R. SPOONER.