

C. E. LIPE.

INDEX HEAD FOR MILLING MACHINES.

No. 292,927.

Patented Feb. 5, 1884.

Fig. 1.

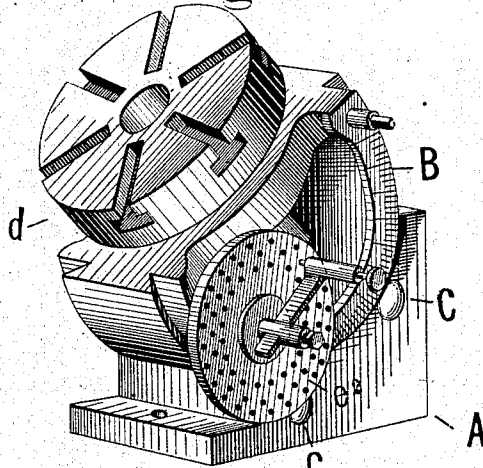


Fig. 2.

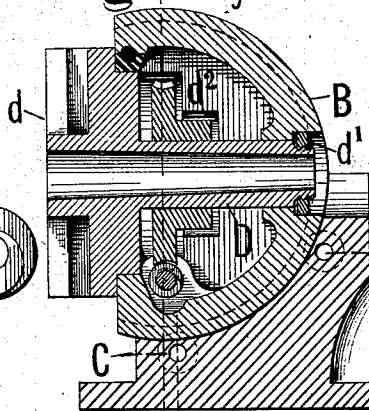


Fig. 3.

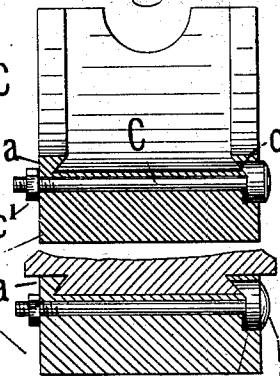
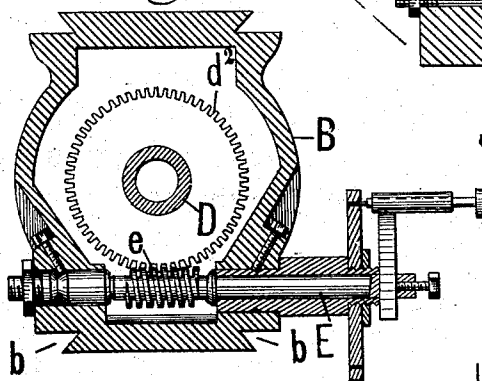


Fig. 5.



Fig. 4.



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(No Model.)

2 Sheets—Sheet 2.

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Fig. 6.

Fig. 7.

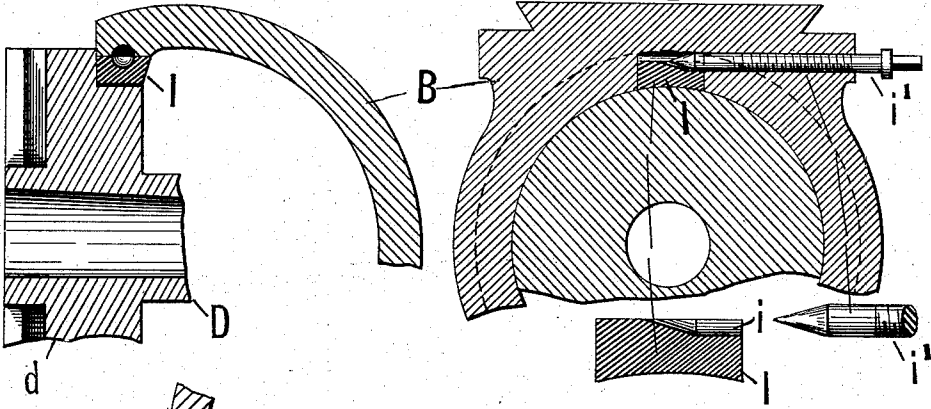


Fig. 8.

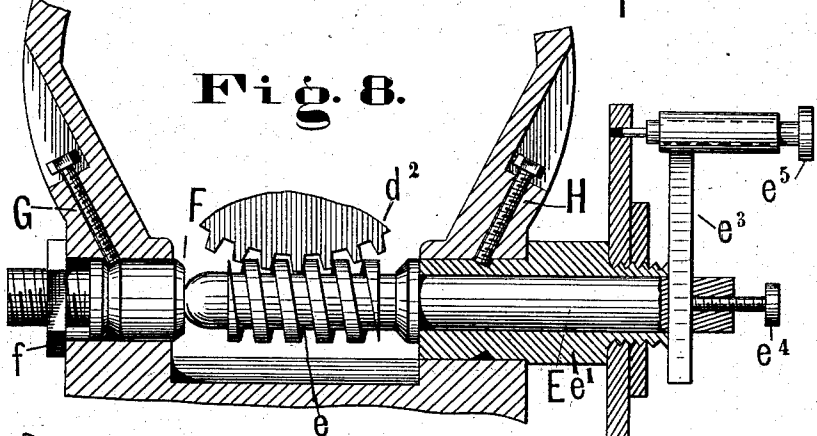
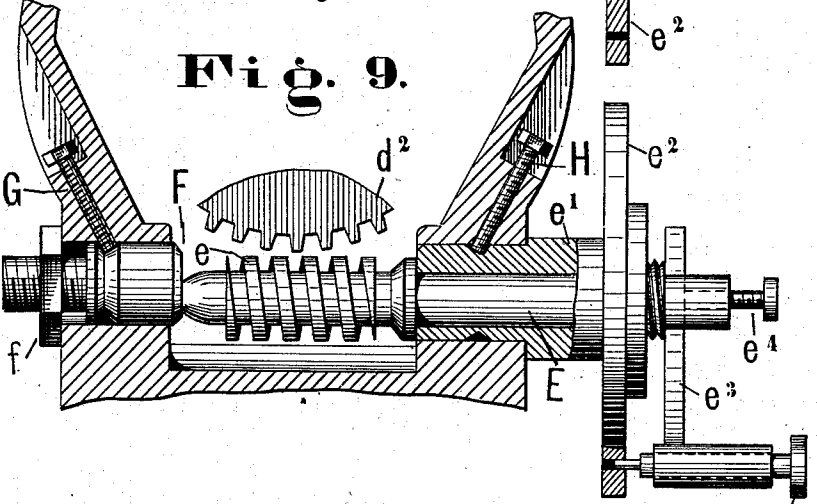


Fig. 9.



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UNITED STATES PATENT OFFICE.

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INDEX-HEAD FOR MILLING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 292,927, dated February 5, 1884.

Application filed June 8, 1883. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. LIPE, of Syracuse, county of Onondaga, and State of New York, have invented new and useful Improvements in Index-Heads for Milling-Machines; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

This invention is designed for supporting spur and bevel gears and other work requiring angular motion, while the same are being cut by the milling-machine; and it consists, mainly, in the combination of a fixed standard or supporting-base having a concave bearing-surface with a movable head having a convex bearing-surface, the construction being such that the head rests solidly upon the base in any position in which it may be adjusted.

It consists, further, in the combination of the head capable of movement in the arc of a circle with a spindle and face-plate, and special mechanism for giving it revolution.

It consists further, also, in certain details of construction, which, in connection with the foregoing, will be fully described hereinafter.

In the drawings, Figure 1 represents a perspective view of my invention; Fig. 2, a vertical section of the same; Fig. 3, a sectional view of the base-piece A, taken on the line *x*, Fig. 2, the upper portion of the same being shown in front elevation; Fig. 4, a transverse section of the swinging head B, taken on the line *y*, Fig. 2, showing the mechanism for actuating the spindle and face-plate; Fig. 5, detail views of the eccentric bush for moving out of gear the worm which actuates the gear-wheel of the spindle; Figs. 6 and 7, enlarged views illustrating the manner of securing the spindle against movement during the cutting action; and Figs. 8 and 9, enlarged views illustrating the special mechanism for actuating the spindle and moving the actuating-worm into and out of gear.

To enable others skilled in the art to make my invention and properly use the same, I will proceed to describe fully its construction and manner of operation.

A, Figs. 1, 2, and 3, represents the base-piece, consisting of a solid block having the form of a right-angled triangle in cross-section,

as shown in Fig. 4, the hypotenuse of which forms the arc of a hollow cylinder, and constitutes the bearing-surface for the removable head, hereinafter referred to.

a a, Fig. 3, represent overhanging projections—one on each side of the base-piece—which extend into corresponding recesses, *b b*, in the head for the purpose of securing the same properly in place without interfering with its freedom to move in the arc of a circle.

B represents the movable head before referred to, consisting of a hollow box of semi-cylindrical form, the outer convex surface of which corresponds precisely with the inner concave surface of the base-piece, as shown, the bearing-face of the former resting solidly upon the bearing-face of the latter in any position in which it may be placed.

b b represent recesses in the head—one on each side—which are adapted to receive the projections *a a* of the base-piece, as shown.

C C represent bolts extending transversely through the base-piece, the head of each of which is provided with an inclined bearing-surface, *c*, adapted to bear upon the inclined surface of the recess *b* of the head, as shown.

c represents a nut upon each bolt, by means of which the head of the same may be caused to clamp the inclined bearing-surface of the head when it is desired to hold the latter rigidly against movement. By means of the described construction the head may be moved in the arc of a circle upon the base-piece, for the purpose of causing the work-table to assume any desired angle relatively to a vertical line, and when adjusted it may be rigidly clamped to secure it against movement under the strain of cutting. The head, it will be observed, in all its positions relatively to the base-piece, rests solidly thereon, so that a perfectly firm and stable support is given the work during all the operations of cutting.

D, Figs. 2 and 4, represents an axial sleeve or spindle, supported by proper bearings in the head B, which has attached thereto at one end the face-plate *d*, having bolt-slots, which receive the heads of bolts for holding the work.

d represents a nut upon the other end of the spindle, which has a bearing against a solid portion of the head, as shown. By means of this nut the spindle D may be drawn properly

to its bearings, and also any wear may be compensated for. The spindle is provided with a tapering hole through the center to receive mandrels, arbors, &c., for holding work that is not adapted to be attached directly to the face-plate.

d^z represents a gear-wheel upon the sleeve, having preferably sixty teeth, which is adapted to engage with the worm e upon the shaft E, as shown.

e' , Figs. 5, 8, and 9, represents an eccentric-bushing, supporting the shaft E, which bushing is itself held by proper bearings in the head, as shown in Fig. 4.

e^2 , Figs. 1, 8, and 9, represents an index-plate attached to the outer end of the bushing e' , concentric with the shaft E, and e^3 a crank-arm, adjustably secured to the end of the shaft by means of a socket opening through the shaft and a set-screw, e^4 , as shown.

e^5 represents a pin in the handle portion of the crank-arm, by means of which the latter, when adjusted, may be held in the desired position.

F represents a cylindrical plug, held in proper bearings in the head B, the inner face of which is adapted to furnish a proper bearing for the inner end of the shaft E, as shown.

f represents a nut upon a threaded portion at the outer end of the plug, by means of which the latter may be adjusted in a longitudinal direction to have proper contact with the end of the shaft.

G represents a set-screw held at an angle in the casing of the head, the lower end of which bears against an inclined annular face of the plug, as shown. By means of this set-screw the plug is rigidly held in any position in which it may be adjusted.

H represents a similar screw, the lower end of which bears against the inclined face of the annular groove in the bushing, and forces the shoulder of the bushing firmly against the side of the head B, and also secures the same against rotative movement. After the bushing e' is in position the plug F may be adjusted to the end of shaft E, so that the collar on the same bears against the inner end of bushing e' .

I, Figs. 6 and 7, represents a bearing-block held in a proper recess in the casing of the head B, the lower side of which rests upon one of the bearing-faces of the spindle, as shown.

i represents a recess in the upper face of the bearing-block, and i' a screw-shaft, having at one end an angular head adapted to receive a wrench, and at the other a conical portion adapted to enter the recess and depress the bearing-block, when desired.

The operation is substantially as follows: The device described having been properly located upon the ordinary work-table of the milling-machine, and its base-piece having been properly secured thereto, the head B may be swung by hand in the arc of a circle upon the base-piece, to cause the spindle and

face-plate carried thereby to assume any desired angle relative to a vertical line. When thus adjusted, the head may be rigidly clamped to the base-piece by means of the screws C C, Figs. 1, 2, and 3. The circular work-table then, if the worm is out of gear, as shown in Fig. 9, may be revolved upon its axial sleeve by hand, for the purpose of bringing the work held thereby in the proper relation to the milling-tool. The worm then may be brought, as shown in Fig. 8, into gear by turning the bushing e' in the proper direction by means of the index-plate e^2 , attached thereto, the eccentric action of the bushing in the fixed bearing of the head giving the shaft E the necessary lateral movement, in the manner well understood. The bushing then may be rigidly locked against movement by means of the screw H. For many purposes this feature of dropping the worm entirely out of gear is not necessary, and in the construction but very little eccentricity may be given to the bushing, the principal object of this movement being to provide a proper adjustment between the worm and gear, so as to be able to take up all looseness between the two that may be caused by wear or otherwise, this being considered a vital point in any dividing mechanism for maintaining accuracy. The spindle itself may then be secured against movement or unnecessary strain on the worm by means of the bearing-block I and shaft i , the inward movement of the shaft causing its pointed end to depress the bearing-block I and clamp the table, as shown in Fig. 7. The first cut then having been made upon the work, the work-table may be released, and be revolved into its new position by means of the crank-arm e^3 , the precise amount of movement being determined by the index-plate in the manner well understood.

The crank-arm e^3 , by means of the slot in the shaft E and the set-screw e^4 , may be adjusted to engage with any one of the different series of holes in the index plate.

The head B is graduated upon its side, so that any desired angle relative to the base-piece may be exactly obtained.

Some of the advantages of the described construction are as follows: It will be observed that the front bearing is very large in diameter, and extends nearly to the periphery of the face-plate, said face-plate and spindle being, preferably, although not necessarily, cast in one piece. The advantages derived are, first, the face-plate always has a firm rim support around its interior circumference, which is a very essential element to produce smooth work on large diameters; second, the openings thus made in the head being larger than the gear, the latter may be accurately located, secured, and tested on the spindle before it is placed in the head. All the working parts, being inside the hollow head, are securely protected from dirt and injury without extra cover or protection. The swinging head has a solid bearing upon the base-piece, and hence the

work is firmly held. The mechanism for throwing the worm into and out of gear is simple in construction, and very effective in operation. The mechanism for locking the parts may be quickly and easily used, and, when used, secures rigid connections, adapted to endure the working strain.

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

1. The combination of a head, substantially as described, capable of movement in the arc of a circle, and carrying the spindle of a work-holding table, with worm-gear mechanism, substantially as described, for revolving the table, and mechanism, substantially as described, for moving the worm in and out of gear.

2. In combination with base-piece A, the gear-wheel d^2 , the worm-shaft E, the bushing e' , for adjusting the worm-shaft relatively to the gear-wheel d^2 , and the set-screw H, for securing the shaft when adjusted, as described.

3. In combination with base-piece A, the worm-shaft E, the cylindrical plug F, having the nut f , and the set-screw G, as described.

4. The base A, having the projections $a a$, in combination with the head B, having the recesses $b b$, and the securing-screw C, as described.

5. The machine described, consisting of the base-piece A, the swinging head B, with screws C C, for clamping the head to the base, the spindle D, with face-plate d and gear-wheel d^2 , and the worm-shaft E, eccentric-bushing e' , with set-screw H, as set forth.

6. The combination of the following elements: the concave base-piece A, adapted to rest upon the bed of the machine, the convex head B, adapted to move in the arc of a circle upon the base-piece, and the spindle D and face d , adapted to revolve in the head B, as described.

This specification signed and witnessed this 5th day of June, 1883.

CHARLES E. LIPE.

Witnesses:

W. C. LIPE,

W. H. PRUYNE.