

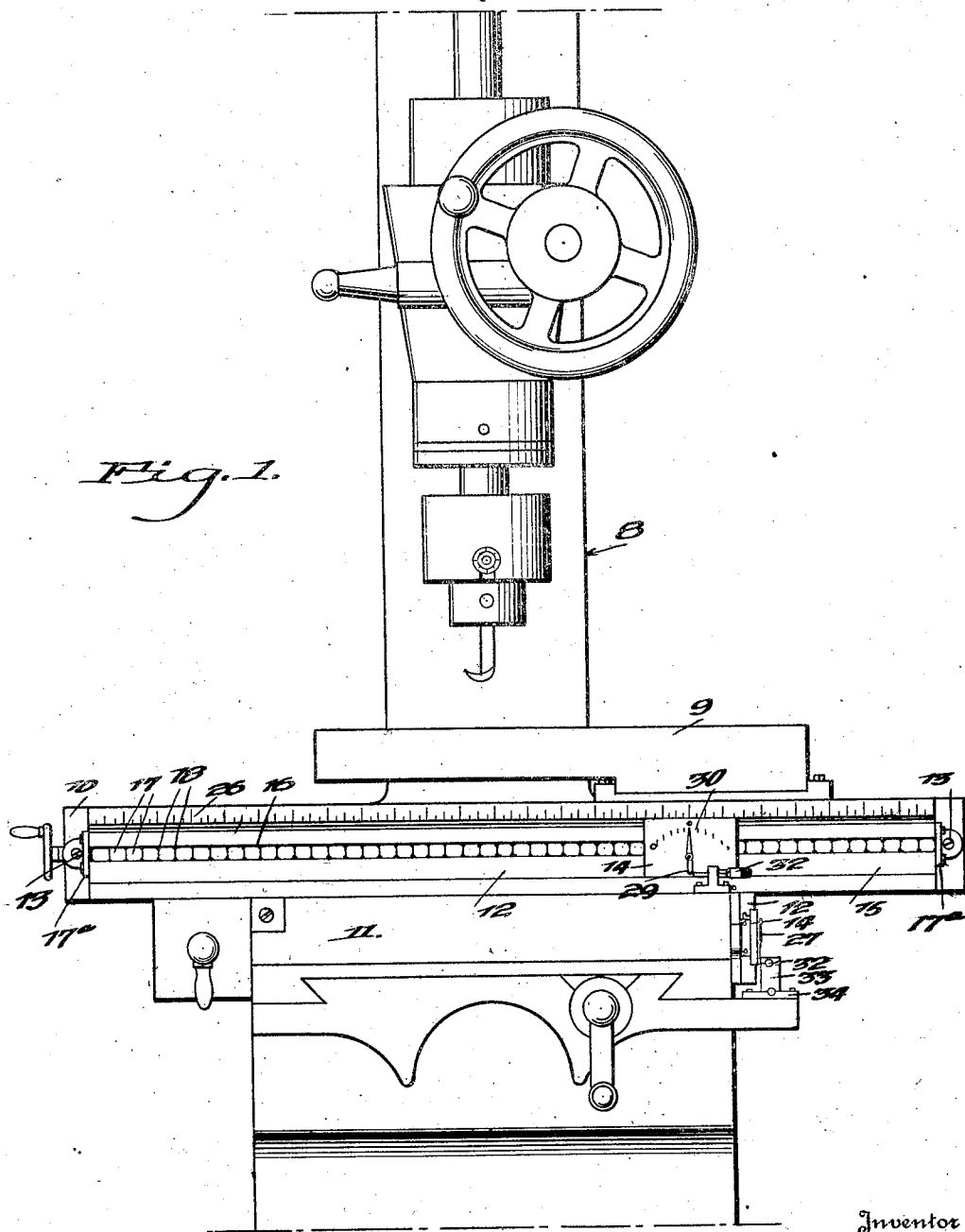
Feb. 28, 1928.

1,660,435

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METAL WORKING MACHINERY

Filed Sept. 4, 1923

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 2.

Fig. 3.

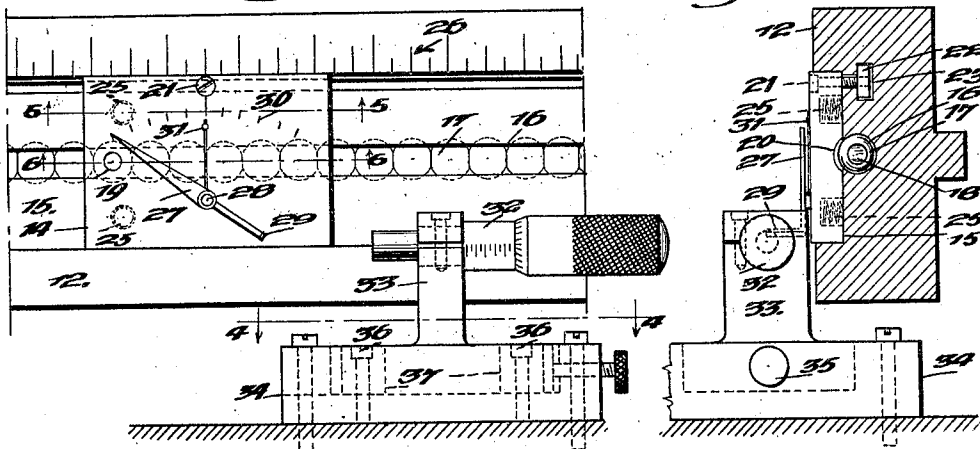


Fig. 4.

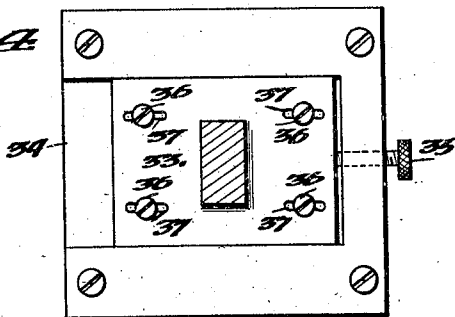


Fig. 7.

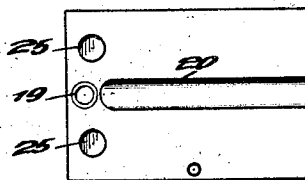


Fig. 5.

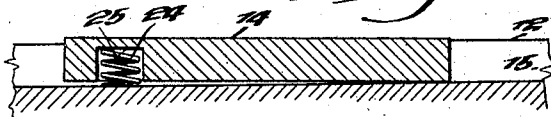
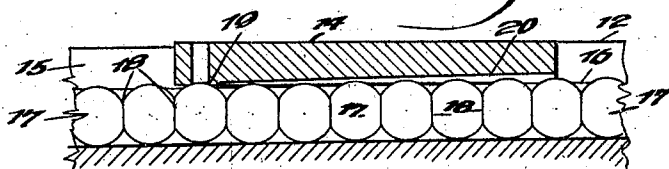


Fig. 6.



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UNITED STATES PATENT OFFICE.

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METAL-WORKING MACHINERY.

Application filed September 4, 1923. Serial No. 660,808.

The present invention relates to metal working machinery, in which great accuracy is necessary, and the object is to provide a device whereby the work can be quickly and accurately positioned on large machines, such as boring machines, milling machines, lathes and similar devices. In Patents Nos. 1,007,185 issued October 31, 1911, and 1,405,670, issued February 7, 1922, are disclosed spacing elements. These devices are accurate where the spacings are not great, but errors are apt to arise when extended measurements are necessary and the present invention is applicable to machines having either vertical or horizontal slides adapted to move comparatively great distances and in which measurements of several feet down to thousandths of an inch can be determined quickly and with great accuracy.

A further object is to provide a device of the character described, which may be supplied either as an attachment to be applied to machines or may be formed integral therewith without any material change in the existing structure of such machines.

In the accompanying drawings:—

Figure 1 is a fragmentary front elevation of a milling and drilling machine with the improvements applied thereto,

Figure 2 is a front elevation of the device.

Figure 3 is an end elevation of the device, parts being shown in section.

Figure 4 is a section taken on the line 4—4 of Figure 2,

Figure 5 is an enlarged section taken on the line 5—5 of Figure 2,

Figure 6 is an enlarged section taken on the line 6—6 of Figure 2.

Figure 7 is a bottom plan view of the indicator slide.

In the present embodiment the invention is shown and described as an attachment.

Referring to the drawings, the invention is shown applied to a milling and drilling machine 8, carrying work 9 mounted on the usual transverse and laterally moving members 10 and 11. The device is applied to each of these members for gauging the amount of movement to be given, and consists of a member 12, which in the present instance, is secured to each of the transverse and laterally moving members 10 and 11 by screws 13, as shown in Figure 1. An indicator slide in the form of a base 14 is mounted in a slideway 15 formed in the face of member 12 and extending the full length thereof.

Formed in the member 12 subjacent to the slideway 15 and communicating therewith is a slot 16 in which positioning elements, preferably steel balls 17, are located. Blocks 17^a are secured upon either end of the member 12, whereby the spacing balls are retained in slot 16. The balls 17 have portions ground away to form flattened, abutting surfaces 18. It will be evident to those skilled in the art that the distance from center to center of these balls may be determined with great accuracy by varying the amount of material removed from opposite sides of each ball. Referring now to Figure 6 it will be noted that portions of the balls 17 project slightly from the slot 16 into the slideway 15, and are receivable in a centering socket 19 formed in the underside of the indicator slide 14. Adjacent thereto and extending longitudinally on the underside of the indicator slide 14 is a groove 20 sufficiently deep to clear the balls 17, and preferably tapering toward its inner end.

The indicator slide 14 is secured in the slideway 15 by means of a screw clamp 21 carried thereby, and having a head 22 operating in a T-slot 23 formed in member 12. Coiled springs 24 are carried in recesses 25 formed in the underside of indicator slide 14 and are adapted to bear against the surface of slideway 15. It is thus evident that when screw clamp 21 is loosened, the springs 24 force the rear end of the indicator slide outward to free it from the balls 17 and the slide may be moved to any desired position and again clamped, whereupon one of the balls will seat itself in the socket 19 and thus position the slide.

The member 12 carries a scale 26, the markings of which are predetermined and are in alignment with the centers of the different balls 17. An indicator 27 is pivoted on the slide, as shown at 28, and provided with an outwardly turned end 29. A scale 30 is in coacting relation to the pointer end of the indicator. The indicator 27 is normally held at one end of the scale, as shown in Figure 2 by a hair spring 31.

Secured on the supporting member is a micrometer 32 detachably carried by a standard 33 that is mounted on a base 34. The standard 33 is longitudinally adjustable by means of thumb screw 35 and clamping screws 36, passing through slots 37 and engaging the base 34, as shown, to hold it in adjusted positions.

It will be appreciated that the indicator slide 14 carrying the pointer 27 and the micrometer 32 constitute gauge elements.

The operation of the device is as follows:

- 6 The work 9, being in position upon the member 10, the central or zero-marking of scale 30 is brought in registration with the zero, or a determined marking, of scale 26. The micrometer 32 is set at zero and the member
- 10 10 moved until the anvil of micrometer 32 contacts the outwardly turned end 29 of the indicator 27, and brings the indicator to the zero marking of scale 30, as shown in Figure 1. The device is now in the initial position for taking a measurement. To take a measurement on the work of, for instance, four feet, six inches, and four hundred twenty-eight thousandths, the micrometer is set at the thousandths and the indicator slide
- 20 moved until the four feet six inches is read on scale 26. The member 10 is now moved until the parts are brought to their initial position to determine the measurement on the work 9. It is evident that in securing lateral measurements the operation is the same, substituting member 11 for member 10.

From the foregoing, it is thought that the construction, operation and many advantages of the herein described invention will be apparent to those skilled in the art, without further description, and it will be understood that various changes in the size, shape, proportion and minor details of construction, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

What I claim, is:—

1. In a machine of the character set forth, the combination with a supporting member, of a work carrying member movably mounted thereon, one of the members having a slot and indicating means longitudinally adjustable in the slot, clamping means therefor, a plurality of positioning elements carried by one of the members to provide stops for the indicating means and comprising spheres having flattened abutting portions, and a gauge element mounted on the other member and coacting with the indicating means.

2. In a machine of the character set forth, the combination with a supporting member, of a work carrying member movably mounted thereon, one of the members having a slot and indicating means longitudinally adjustable in the slot, spacing elements carried by one of the members comprising spheres, portions of which detachably engage the indicating means to regulate the positioning thereof, and a gauge element mounted on the other member and coacting with the indicating means.

3. In a machine of the character set forth, the combination with relatively movable supporting and work-carrying members, of

coacting gauge elements carried respectively thereby and one of which is adjustable on its members, and a plurality of substantially spherical elements to regulate the positioning of said gauge element and supported in one of the movable members, said gauge element being adapted to engage different of the spherical elements.

4. In a machine of the character set forth, the combination with relatively movable supporting and work carrying members, of coacting gauge elements carried respectively thereby, and positioning elements comprising spheres having flattened abutting faces carried by one of the members and slidably contacting with one of the gauge elements to regulate the positioning thereof.

5. A spacing attachment for metal working machines, comprising a slotted member adapted to be secured to a movable work-carrying part thereof, an indicator slide longitudinally adjustable in the slot, and means for clamping the indicator slide therein, adjustable elements regulating the positioning of the slide, an indicator movably mounted on the slide, and a gauge adjustably mounted on a stationary part of the machine and coacting with the indicator to move it on the slide.

6. In a machine of the character set forth, the combination with relatively movable supporting and work carrying members, of means for gauging their relative positions, including an element having a base adjustably mounted on the member, said member and base being provided one with a slot, a plurality of balls in the slot and projecting therefrom, and the other having a socket that is adapted to receive the projecting portions of the balls and thereby position the base and element at different points on the member.

7. In a machine of the character described, the combination with relatively movable supporting and work carrying members, of means for gauging their relative positions including an element having a base adjustably mounted on the member, said member being provided with a slot, a plurality of balls in the slot and projecting therefrom and said base having a socket that is adapted to receive the projecting portions of the balls and thereby position the base and element at different points on the member.

8. In a machine of the character set forth, the combination with relatively movable supporting and work-carrying members, one of said members having a longitudinal guideway and a longitudinal slot in the bottom thereof, positioning devices removably mounted in the slot projecting into the guideway, a gauge element longitudinally adjustable in the guideway and having a socket for the reception of the positioning devices and means for locking a gauge element when positioned.

9. In a machine of the character set forth, the combination with relatively movable supporting and work carrying members, one of said members having a longitudinal guideway and a longitudinal slot in the bottom thereof, positioning devices detachably fitted in the slot and projecting into the guideway, a gauge element having a base longitudinally adjustable in the guideway and having a socket for the reception of the positioning devices, spring means for detaching the base from the projections to permit its movement, and means for clamping the base in the guideway and upon the different projections.

10. In a machine of the character set forth, the combination with a supporting member, of a work carrying member adjustable thereon, a micrometer mounted on one of the members, a base adjustable along the other member, means for positioning and fixing said base on said other member, a pointer pivoted on the base and having a portion in the path of the micrometer, and a scale for the pointer.

11. In a machine of the character set forth, the combination with a supporting member, of a work carrying member adjustable thereon, a micrometer mounted on the base, the work carrying member having a guideway and a longitudinal slot in the guideway, balls in the slot projecting into the guideway, a base adjustable in the guideway and having a socket to receive the projecting portions of

the balls, means for clamping the base against movement and over the different balls, a pointer on the base moved by the engagement with the micrometer, and a scale upon the base.

12. In a machine of the character set forth, the combination with the base member, of a work-carrying member slidable thereon, a slide block slidably mounted on the work-carrying member, positioning means with which the block engages when moved to different positions on the work carrying member, an indicator movably mounted on the block, and a micrometer head on the base in the path of the indicator and moving the same on the block when the same engages the micrometer head.

13. In a machine of the character set forth, the combination with a base member, of a work-carrying member slidable thereon and having a slot in its front face, a plurality of elements projecting from the slot, a slide block slidably mounted on said front face over the slot and having means for engagement with the different projections, an indicator movably mounted on the block, and a micrometer head on the base in the path of the indicator and moving the same on the block when the same engages the micrometer head.

In testimony whereof, I affix my signature.

CLARENCE C. CRALEY.