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2,498,460

TILT INDICATING ATTACHMENT FOR MACHINE HEADS

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2 Sheets-Sheet 1

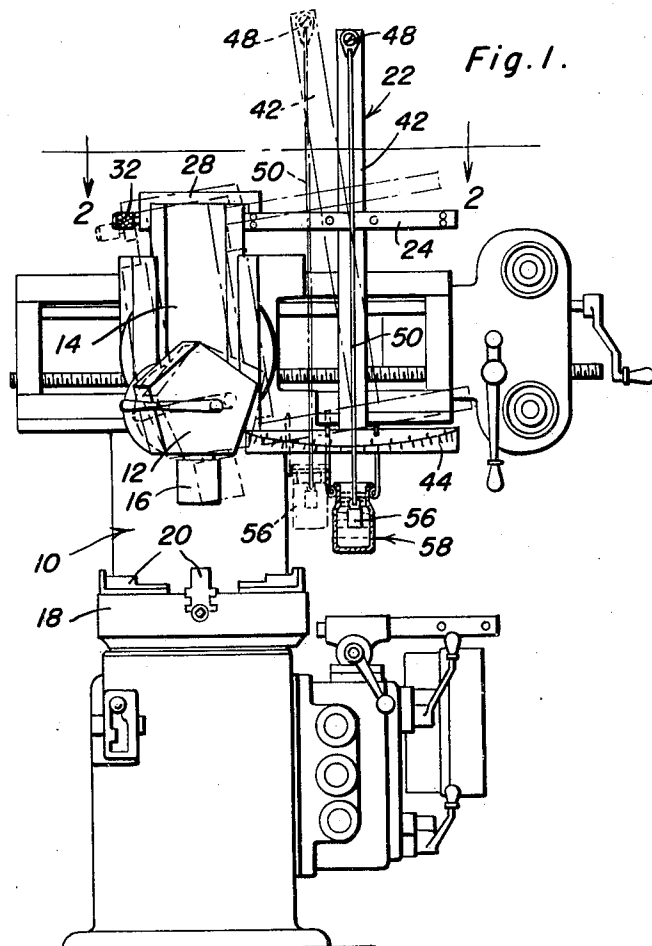
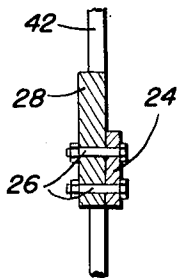
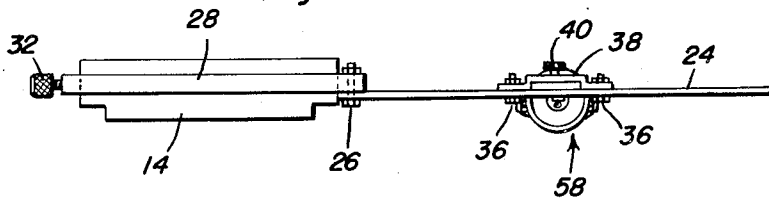


Fig. 3.



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2 Sheets-Sheet 2

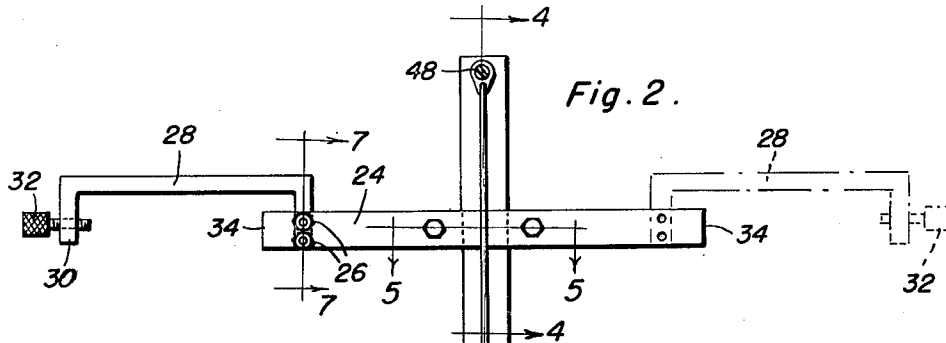


Fig. 2.

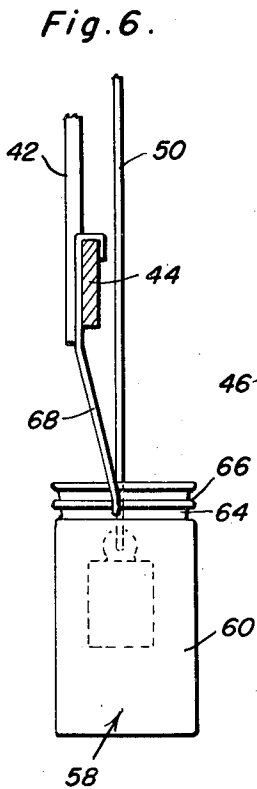


Fig. 6.

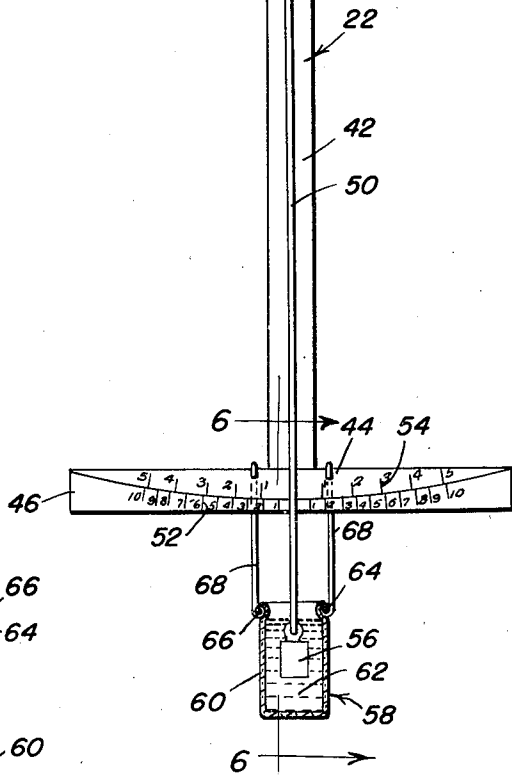


Fig. 5.

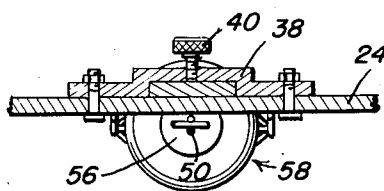


Fig. 4.

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UNITED STATES PATENT OFFICE

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TILT INDICATING ATTACHMENT FOR
MACHINE HEADS

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3 Claims. (Cl. 33—207)

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This invention relates to a position indicating attachment for a tiltable machine head and has for its primary object to facilitate the setting of the head of a machine for performing various cutting operations.

Another object is to enable the rapid setting of the tiltable head of a vertical boring mill and to register the degrees of tilt, as well as the taper per foot of a hole being formed by the boring mill in a piece of work.

In setting up a machine such as the vertical boring mill for boring a tapered opening in a piece of work it becomes necessary to adjust the tilt of the head thereof about a horizontal axis to the proper degree to bore a hole having the desired taper. Such setting up operations have heretofore been time consuming and required the services of an expert setting up machinist who was required not only to adjust the head to the proper angle but also to calculate the proper position of the head to achieve the boring of a hole having a predetermined taper. It is well known that the "set-up man" in an industry is one of the highest paid employees for the simple reason that a great deal of skill is required properly to set the head of the machine.

It is therefore another object of this invention to reduce labor costs to a minimum without the sacrifice of accuracy in the finished product, and to enable the machine attendant properly to set up the machine for boring accurate tapers irrespective of whether the dimensions from which he is working are given in degrees or taper per foot of the bore.

The above and other objects may be attained by employing this invention which embodies among its features a supporting arm adapted to be clamped to the tiltable head of a machine, a perpendicular leg depending from the arm, a scale carried by the leg adjacent its lower end, a suspension member pivotally suspended from the upper end of the leg and movable over the face of the scale and a plumb bob suspended from the lower end of the suspension member whereby as the head is tilted the plumb bob will cause the suspension member to move over the face of the scale, thereby to indicate the degree of tilt or the taper per foot of the bore to be formed.

Other features include means suspended from the scale and adapted to enclose the plumb bob to dampen any movement thereof and prevent vibration of the suspension member, thereby to assure an accurate reading of the scale.

Still other features include graduations on the scale to cooperate with the suspension member in

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indicating the tilt of the head, a jar adapted to be detachably suspended from the scale and to receive the plumb bob and a vibration dampening fluid in said jar.

5 In the drawings:

Figure 1 is a front view of a conventional boring mill showing this position indicating attachment mounted thereon,

10 Figure 2 is an enlarged detail front view of the attachment, certain portions thereof being shown in section more clearly to illustrate certain details of construction,

Figure 3 is a plan view of the device illustrated in Figure 2 showing it mounted on the slide of the tool mount of the machine,

15 Figure 4 is an enlarged vertical sectional view taken substantially along the line 4—4 of Figure 2,

Figure 5 is an enlarged horizontal sectional view taken substantially along the line 5—5 of Figure 2,

20 Figure 6 is an enlarged fragmentary sectional view taken substantially along the line 6—6 of Figure 2, and

25 Figure 7 is a fragmentary enlarged sectional view taken substantially along the line 7—7 of Figure 2.

Referring to the drawings in detail a boring mill designated generally 10 of any conventional construction is provided with a conventional tilting head 12 carrying the customary vertical slide 14 which together with the head 12 is tiltable around a horizontal axis to move the tool chuck 16 into various different angles from the vertical. The machine 10 is equipped with a conventional table 18 carrying clamp jaws 20 in which the work to be bored is supported in a conventional manner.

My improved position indicating attachment is designated generally 22 and comprises a substantially horizontal arm 24 to which is detachably connected as by screws 26 and inverted U-shaped clamp 28, the leg 30 of which is equipped with a suitable clamp screw 32 the point or clamping end of which projects toward the end of the arm 24 adjacent which the clamp 28 is secured. As illustrated in Figure 2 the clamp 28 may be attached adjacent the opposite end of the arm so as to operate on the opposite side of the head of a machine which is to be set-up, and the end faces 34 of the arm 24 are adapted to engage the side of the slide 14 of the machine as illustrated in Figure 1.

55 Secured as by bolts 36 to the arm 24 substantially midway between opposite ends 34 thereof is a U-shaped yoke 38, the bight portion of which

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is provided with a set screw 40 for a purpose to be more fully hereinafter explained. Mounted for vertical sliding movement in the yoke 38 and extending perpendicularly from the arm 24 is a leg 42 which projects through the yoke 38 and is held in various adjusted positions therein by the clamp screw 40. Fixed to the end of the leg 42 remote from the arm 24 is a scale 44 which scale is coextensive with the arm 24 and lies in parallel relation therewith. Opposite ends 46 of the scale lie in planes parallel with the ends 34 of the arm 24 and cooperate with the ends 34 in forming locating surfaces for engagement with the slide 14 of the machine 10, accurately to locate the leg 42 in spaced parallel relation with the side of the head.

Pivotally suspended as at 48 to the end of the leg 42 remote from the scale 44 as a suspension member 50 which moves over the face of the scale 44 and cooperates with the indices 52 and 54 of the face thereof and indicating the degrees of tilt of the head of the machine as well as the taper per foot of the hole bored by the tool supported in the tool holder 15. A plumb bob is suspended from the end of the suspension member, so that as the arm 24 and leg 42 tilt with the machine head 12, the suspension member will move across the face of the scale 44.

In order to assure accuracy of the reading, and to avoid movement of the suspension member under extraneous influences I provide a vibration dampener designated generally 58 which comprises a cylindrical jar or receptacle 60 containing a vibration dampening fluid 62 such as heavy oil, mercury or the like. This jar 60 is provided adjacent its upper ends with an annular groove 64 for the reception of a suspension ring 66 carrying upwardly extending hooks 68 which as illustrated in Figure 6 are adapted to engage over the upper edge of the scale 44 and hold the vibration dampener 58 in proper position around the plumb bob 56 to prevent movement of the latter under extraneous forces which would tend to cause the suspension member 50 to move across the face of the scale 44 and give a false reading.

In use the attachment 22 is mounted on the slide 14 of the machine 10 as illustrated in Figure 1 and the machine head 12 moved about its horizontal axis with the suspension member 50 moving across the face of the scale 44 until the desired tilt of the head 12 has been achieved. The vibration dampener 58 is then suspended from the scale 44 in a position to enclose the plumb bob 56 and the final adjustment of the head is then made. As illustrated in Figure 1 the suspension member 50 moves across the face of the scale 44 to cooperate with the indices 52 and 54 and if the dimension of the tilt of the head 12 is given in degrees it is obvious that the indices 52 on the scale 44 are used. It frequently happens however that dimensions are given in the taper per foot and in this event the indices 54 are employed, it being understood that both sets of indices are calibrated to give an accurate reading of the tilt of the head.

By the simple expedient of employing this position indicating attachment, it is obvious that the tilt of the machine head may be accurately and quickly achieved, without requiring the services of a highly specialized technician such as the machine set-up man.

While in the foregoing there has been shown and described the preferred embodiment of this invention it is to be understood that minor

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changes in the details of construction, combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as claimed.

Having described the invention, what is claimed as new is:

1. In a machine of the vertical boring mill type having a head which is tiltable about a horizontal axis and a tool carrying slide mounted on said head, a tool position indicator for said machine comprising a substantially vertical leg, a cross bar fixed midway between opposite ends to the leg adjacent the lower end thereof, indices on one face of said cross bar, a suspension member pivotally suspended from the vertical leg adjacent the upper end thereof, said suspension member being movable over the face of the cross bar carrying the indices, a plumb bob carried on the suspension member below the cross bar, a cross arm mounted midway between opposite ends to slide on the leg between the cross bar and the point of suspension of the suspension member, said cross arm being coextensive with the cross bar and cooperating therewith in holding the leg in spaced parallel relation to the slide, and a clamp detachably coupled to one end of the cross arm detachably to engage the side of the slide remote from the leg and demountably hold the tool position indicator on said slide.

2. In a machine of the vertical boring mill type having a head which is tiltable about a horizontal axis and a tool carrying slide mounted on said head, a tool position indicator for said machine comprising a substantially vertical leg, a cross bar fixed midway between opposite ends to the leg adjacent the lower end thereof, indices on one face of said cross bar, a suspension member pivotally suspended from the vertical leg adjacent the upper end thereof, said suspension member being movable over the face of the cross bar carrying the indices, a plumb bob carried on the suspension member below the cross bar, a cross arm mounted midway between opposite ends to slide on the leg between the cross bar and the point of suspension of the suspension member, said cross arm being coextensive with the cross bar and cooperating therewith in holding the leg in spaced parallel relation to the slide, a clamp detachably coupled to one end of the cross arm detachably to engage the side of the slide remote from the leg and demountably hold the tool position indicator on said slide, and vibration dampening means detachably suspended from the cross bar and enveloping the plumb bob.

3. In a machine of the vertical boring mill type having a head which is tiltable about a horizontal axis and a tool carrying slide mounted on said head, a tool position indicator for said machine comprising a substantially vertical leg, a cross bar fixed midway between opposite ends to the leg adjacent the lower end thereof, indices on one face of said cross bar, a suspension member pivotally suspended from the vertical leg adjacent the upper end thereof, said suspension member being movable over the face of the cross bar carrying the indices, a plumb bob carried on the suspension member below the cross bar, a cross arm mounted midway between opposite ends to slide on the leg between the cross bar and the point of suspension of the suspension member, said cross arm being coextensive with the cross bar and cooperating therewith in holding the leg in spaced parallel relation to the slide, a clamp detachably coupled to one end of the cross arm detachably to engage the side of the slide re-

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mote from the leg and demountably hold the tool position indicator on said slide, a vibration dampening liquid container detachably suspended from the cross bar in spaced enveloping relation to the plumb bob and vibration dampening liquid in said container enveloping said plumb bob.

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