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SURFACE PLATE DEVICE

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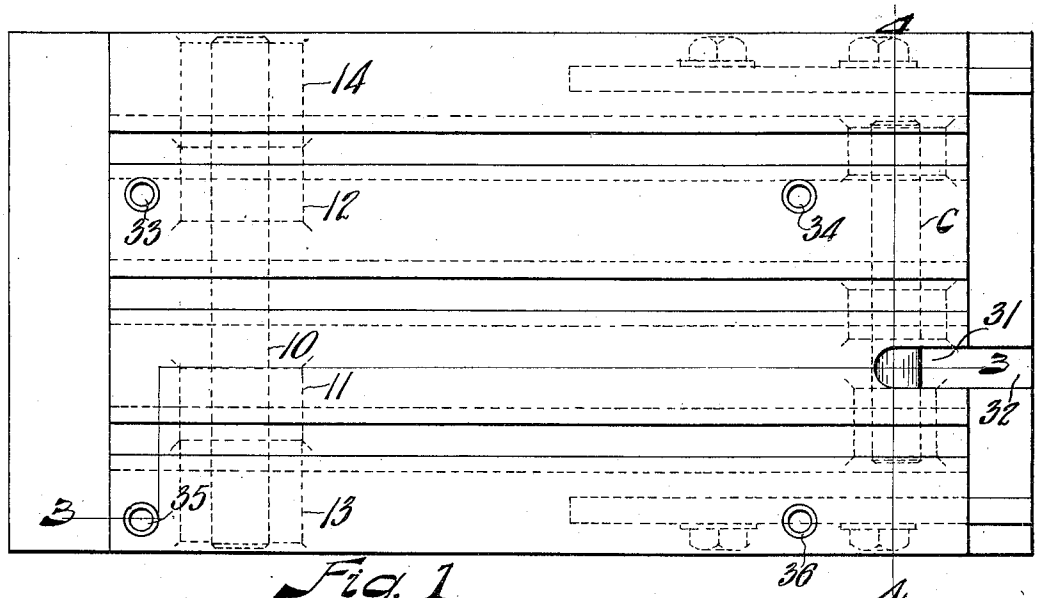


Fig. 1

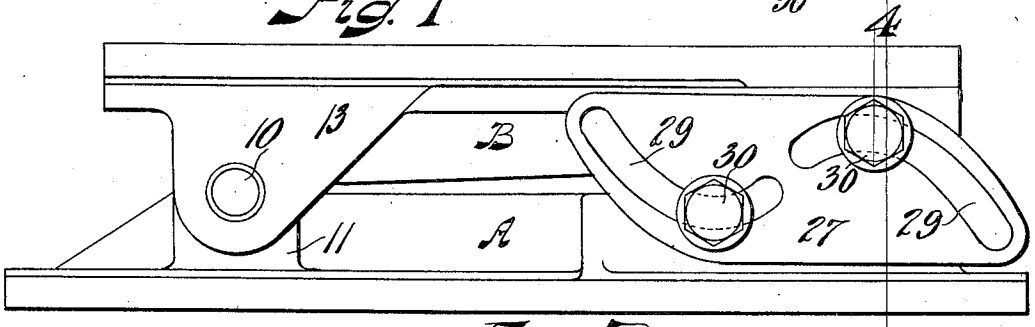


Fig. 2

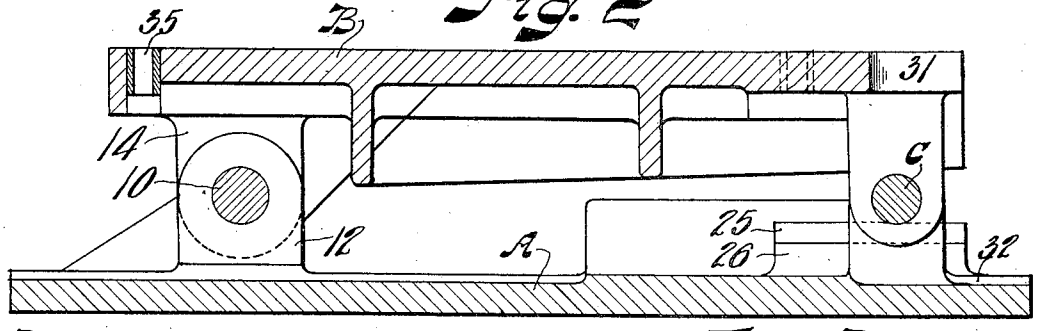


Fig. 3

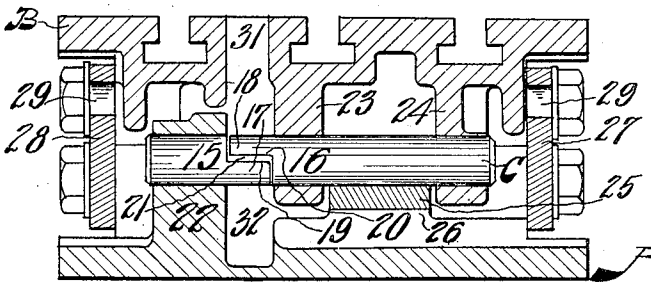


Fig. 4

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SURFACE PLATE DEVICE

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7 Claims. (Cl. 33—174)

Our invention relates to surface plate devices which have an angularly adjustable top.

The present invention is an improvement on our pending application, Serial No. 591,216, which discloses some features of our invention and involves new adjustment and new checking and new adjustment holding means and new means to attain angles not attainable with the device itself.

The object of our invention is to provide a surface plate which is angularly adjustable; which is easily and positively adjustable as to angularity; which has special means for locating articles on the device to attain various angularities in addition to the angularities attainable by the device itself such as locating an article on the device at such an angle that this angularity, combined with an angle obtainable on the device itself, will locate the article at a compound angle with the base of the device; which has means to determine and to check the adjustment thereof as to angularity; and in which the holding of the adjustment is quite positive.

In prior devices of the same nature, it is necessary to use the cut and try method to get the proper angularity; there is no ready means to check the angularity on the device itself; and there is no means of attaining a compound angle for an article.

We attain our objects by the mechanism illustratively shown in the accompanying drawing, forming part of this specification, in which drawing:

Fig. 1 is a plan view of a surface plate device embodying our invention.

Fig. 2 is a side view of the device shown in Fig. 1.

Fig. 3 is a vertical section taken on the line 3—3 of Fig. 1, longitudinally of the device.

Fig. 4 is a vertical section taken on the line 4—4 of Fig. 1 or 2, transversely of the device.

Similar reference characters refer to similar parts throughout the views.

The specific structure shown in the drawings mentioned above is as follows:

The pivot shaft 10 extends through the bosses 11 and 12 on the base A and through the bosses 13 and 14 on the movable surface plate B and forms a pivot pin for the plate B to swivel or pivot on in relation to the base A so that the plate B can be swiveled or pivoted to any angularity between the bottom of the base A and the top of the plate B within the capacity of the device.

The shaft 10 may be journaled in all of the bosses or may be driven into the bosses 11 and 12 and journaled in the bosses 13 and 14, or driven into the bosses 13 and 14 and journaled in the bosses 11 and 12. Also, the shaft may be hardened and ground and hardened and ground bushings may be provided in the journal forming bosses.

The stop pin C is made in two parts 15 and 16 having the axes thereof in alignment when the top of the plate is parallel with the bottom of the base in this instance. The adjacent ends 17 and 18 of the pin are cut away on one side to a little below the axes thereof so that the parts 17 and 18 overlap each other but the faces 19 and 20 do not contact each other when the axes are in alignment as mentioned above. The space 21 created by this cutting away may be filled with one or more spacers, removable or otherwise, when it is desired to use such means for adjustment of the plate B in relation to the base A.

The part 15 is driven into the boss 22 on the base A and the part 16 is driven into the bosses 23 and 24 as shown.

The spacing block 25 is supported on the boss 26 of the base A and, in the present instance, is shown of such thickness that the axes of the parts 15 and 16 are in alignment when the part 16 contacts the block.

The clamping plates 27 and 28 contact the sides of the base A and of the plate B and in no case of adjustment of the plate B do the same project beyond the bottom of the base nor the top of the surface plate B.

The slots 29 through the plates are arcuate and so developed that the clamping plate can move individually and follow the adjustment of the surface plate over the screws 30 so that the tightening of the two screws will clamp the clamping plate against the sides of the base and the surface plate in any adjusted position thereof and hold the same in that position.

It is noted that the relation of the slots 29 is arranged so that, when the surface plate is swiveled on the axis of the pivot shaft 10, the axes of the screws 30 come near dead centers as the angularity between the base and the plate increases and thereby mitigates the tendency of the plates to slip so that the surface plate is practically securely held in adjusted position by merely tightening the screws 30.

In addition to the above-described clamping or holding by the plates 27 and 28 and the screws 30, the below-described gage block may be used to prevent the surface plate from moving down and out of adjustment.

We prefer that the spacing from the axis of the pivot shaft to the axis of the stop pin be made

of some even dimension, preferably ten or a multiple thereof, so that the thickness of a block required to be placed onto the block **26** can easily be calculated by the rules of triangulation. The hypotenuse will always remain the same, i. e. the distance between the axes of the shaft and pin, so that inspection of a table of sines and moving of the decimal point will give the required thickness of such a spacing block with very little calculation. These blocks, not shown in the drawing, so calculated, are introduced between the block **25** and the bottom of the stop pin C and may be left there during use of the device in that particular adjustment to form a positive means to prevent the surface plate B from moving down and out of adjustment.

In order to measure the angular adjustment of the plate, or to check the same when spacing blocks are used, we provide the relief **31** in the surface plate and the relief **32** in the base. The reliefs are spaced to expose the pin parts **17** and **18** so that a measuring instrument can be inserted over them to adjust the plate or to check the adjustment thereof. The reading of the measuring instrument should correspond to the measurement found by the calculation mentioned above plus the diameter of the stop pin.

Two rows of hollow bushings, one row comprising the bushings **33** and **35**, the other row comprising the bushings **34** and **36** are provided in the top of the surface plate B and a line drawn through and intersecting the axial axis of each bushing of each row of bushings is exactly parallel with the axis of the shaft. The distance between the axes of the bushings **33** and **34** as well as between the bushings **35** and **36** is the same and preferably of ten units or a multiple of ten. The distance between the axes of the bushings **33** and **35** as well as between the bushings **34** and **36** is the same and these last mentioned distances are preferably one-half or some easily divisible fraction of the first mentioned distances to aid in the calculations. The bushings **33** and **35** are each the same distance from the axis of the pivot shaft **10**, likewise the bushings **34** and **36**.

When one or more holes are to be drilled in a piece of work placed onto the work receiving plate B and these holes are to have a certain relation with each other, locating members are inserted into the bushings in the table B. The work piece is then shifted about on the table B and related to the locating members as desired. The locating members form a definite relating point since the vertical axes thereof bear a definite relation to the horizontal axis of the swivel pin **10** and therefore form definite points to measure from or to and relate the work so that holes will have a desired relation to each other when drilled after this setting. This ability to locate work on the table easily and conveniently by means of the locating members and thus relating it in a definite relation to the axis of the swivel pin **10** without resorting to measurements and the like from or to body parts of the device except the locating members which are easily available for work setting purposes, saves considerable time in work setting and is quite useful in many cases.

To drill a hole angular with the base, or when a hole is to be angular with the base, the plate B is swivelled on the shaft **10** until the required angularity is attained. Measurement of this angularity is attained either by the spacing block **25** made of a proper thickness or by applying a measuring instrument over the overlapping ends of the measure members. This adjustment permits of boring the hole angular with the bottom of the base.

The location of the pivot shaft **10** near one end of the table B brings one part of the article further away from the axis of the pivot shaft and, consequently, that one part swivels on a larger radius from the axis of the pivot shaft than the other part and moves further than the other part when the surface plate is swiveled on the axis of the pivot shaft and the boring tool for the hole in the article will produce a hole of a compound angle with the top of the surface plate and the bottom of the article or, in other words, the tool produces the hole at one angle due to the angularity of the article on the surface plate and at another angle due to the swivel of the surface plate and the article thereon. These double angle features, of course, combine to locate the article so that the tool produces one hole having an angularity which is the resultant of the two combined angles.

When the surface plate is swiveled on the pivot shaft **10**, the part **15** with the part **17** thereon remains in position in the base while the part **16** with the part **18** thereon remains in position in the plate B but moves with it and thereby changes its relation with the block **25** and the part **17**. A measuring instrument can be applied over the parts **17** and **18** to measure the angular distance through or to which the surface plate has been swiveled or tilted or moved.

We are aware that changes and modifications can be made in the device herein illustratively shown and described within the spirit and intent of our invention and of the appended claims; therefore, without limiting ourselves to the precise structure and arrangement of the parts of the device as shown and described,

We claim:

1. A surface plate device including a base, a surface plate angularly adjustable on said base, and partly overlapping measure members, one on said base and the other on said plate, both of said members being within the confines of said device, and there being alined reliefs in said base and said surface plate to expose the overlapping parts of said measure members for access thereto of a measuring instrument to measure the angularity between said base and said plate.

2. A surface plate device including a base, a surface plate hinged onto said base, and partly overlapping measure members, one on said base and the other on said plate, both of said members being within the confines of said device, and there being alined reliefs in said base and said surface plate to expose the overlapping parts of said measure members for access thereto of a measuring instrument to measure the angularity between said base and said plate.

3. A surface plate device including a base, a work receiving plate angularly adjustably hinged onto said base, a measure member fixed in said base, a measure member fixed in said plate, one end of one of said members overlapping an adjacent end of the other to provide a means for applying both ends of a measuring instrument over the outside of said overlapping ends to determine angularity of said plate relative to said base, and means to releasably retain said plate in adjusted relation to said base.

4. A surface plate device including a base, a work receiving plate angularly adjustably hinged onto said base, a measure member within said

base, a measure member within said plate, one end of one of said measure members overlapping an adjacent end of the other to provide a means for applying both ends of a measuring instrument over the outside of said overlapping ends while the device is resting on a support to determine angularity of said plate relative to said base, there being corresponding reliefs in said base and in said plate to expose said overlapping ends for access thereto of said measuring instrument while the device is resting on a support, and means for releasably retaining said plate in adjusted relation to said base.

5. A surface plate device including a base, a work receiving plate angularly adjustably hinged onto said base, a boss on said base, a spacing block on said boss, a measure member in said plate to contact said spacing block, a measure member in said base, one end of one of said measure members overlapping an adjacent end of the other to provide a means for applying both ends of a measuring instrument over the outside of said overlapping ends to determine angularity of said plate relative to said base, and a one piece clamping plate on each side of the device, each of said clamping plates held releasably against said base and said work receiving plate and being positionally shiftable to retain said work receiving plate in various angularly adjusted relations to said base.

6. A surface plate device including a base, a work receiving surface plate hinged onto said base to adjustably swivel about a definite axis, a measure member fixed in said base, a measure member fixed in said plate, one end of one of said members overlapping an adjacent end of the other for applying both ends of a measuring instrument over the outside of said overlapping ends to determine angularity of said plate relative to said base, bushings in said surface plate to serve as measuring points for locating work thereon in addition to the location of work afforded by angular adjustment of said plate, and clamping plate and screw means to releasably retain said surface plate in various adjusted relations to said base.

7. A surface plate device including a base, a work receiving surface plate hinged onto said base to adjustably swivel about a definite axis, a measure member within said base, a measure member within said plate, one end of one of said members overlapping an adjacent end of the other for applying both ends of a measuring instrument, over the outside of said overlapping ends to determine angularity of said plate relative to said base, there being corresponding reliefs in said work receiving plate and in said base to expose said overlapping ends for access thereto of said measuring instrument, bushings in said surface plate to serve as measuring points for locating work on said surface plate in addition to the location of work afforded by angular adjustment of said plate, a one piece clamping plate on each side of the device, each of said clamping plates being in contact on said base and on said work receiving plate and having oppositely arcuate slots therethrough, and screws through said slots and tapped, respectively, into said base and into said work receiving plate to releasably retain said work receiving plate in adjusted relation relative to said base.

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