D. P. BECKWITH.

PLUG GAGE.

APPLICATION FILED MAY 5, 1913.

1,090,901.

Patented Mar. 24, 1914.

Fig. 1

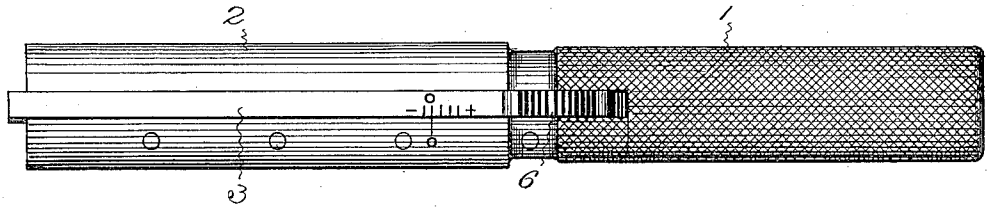


Fig. 2

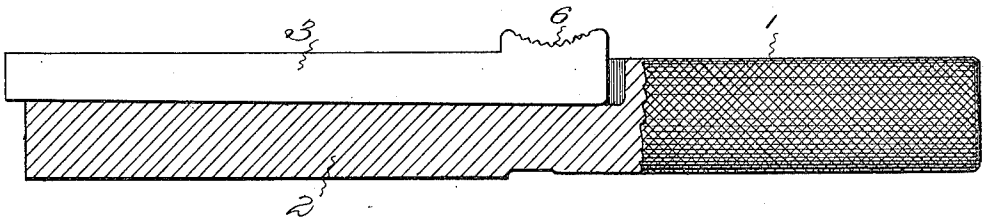
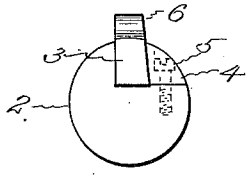


Fig. 3



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UNITED STATES PATENT OFFICE.

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PLUG-GAGE.

1,090,901. Specification of Letters Patent. Patented Mar. 24, 1914.

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To all whom it may concern:

Be it known that I, DANIEL P. BECKWITH, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented a new and useful Improvement in Plug-Gages, of which the following is a specification.

This invention relates to those tools which are provided as standards of absolute size of the openings in collars, sleeves and other machine parts that it is essential shall be of exact dimensions, or within, for instance, .001 of an inch above or below the exact size.

It is common practice for engine and machine builders to have solid standard plugs of the exact sizes of openings to be made. When a large number of collars, sleeves or other machine parts is to have holes the same size, it is usual at intervals during the stages of manufacture to attempt to insert the proper plug into the holes. As the holes are ground down to the correct size the plug just slips in. The repeated trials and fitting insertions of the plug into the holes consumes much time and labor and even when exact as to size it is somewhat difficult to push the plug into the close fitting holes. Furthermore as the clearance is slight the plug soon becomes worn and must be discarded or ground down to a smaller size. The result of this is that it frequently happens that the workman grinds the holes a little over size. It is the custom of many machine builders to have inspectors test collars, sleeves and other parts with standard solid plug gages to ascertain if the holes are of exact size or are too large or too small. This is a tedious and slow operation to perform with a solid plug of exact size if there is a large number of pieces to be inspected, for as the fit is necessarily close it is not easy to slip the parts on the plug, and furthermore, there is no way of knowing how much variation there is in the dimensions of the holes above or below the exact size, that is, whether as it is termed if the variation is within tolerated limits, or if the hole is so small it must be made larger or is so large that the piece must be discarded.

The object of this invention is to produce a very simple tool of this character which can be conveniently used during the manufacture of collars, sleeves and other hollow pieces as a standard of the sizes to which the openings must be made, or which can be employed for inspecting finished collars, sleeves and other hollow pieces to determine if the openings are of exact size and perfectly round and if not, to indicate whether the openings are too large or too small and how much they vary from the desired exact measurement and wherein they depart from a true cylinder; the tool being so shaped and manipulated that much time and labor are saved, the exact variation is indicated, the wear is reduced to a minimum and when the plug does become worn it can be easily regaged and again used for gaging holes of the same dimension.

Figure 1 of the accompanying drawings shows a plan of a gage which embodies this invention. Fig. 2 shows a side view of the same with a part of the body in section. Fig. 3 shows an end view of the gage.

The gage which is illustrated is designed as a standard for holes 1″ in diameter and to indicate variations from .001″ below exact size to .003″ above exact size, although of course the invention is not limited to a plug of this exact size, nor to one indicating these precise variations. The tool shown is formed of a cylindrical bar of hardened steel with a handle section 1 and a body or gage section 2. The body is ground to a perfect cylinder having a diameter that is slightly smaller, for example .001 of an inch, than the exact size of the holes it is to be used to gage. This permits the collar, sleeve or other part to be easily slipped on the body of the gage. In one side of this gage body is a slot which extends longitudinally and contains a close fitting lengthwise movable slide 3. The slot shown is wider at the bottom than at the top and deeper at the inner end than at the outer end, and of course the slide is also wider at the bottom than at the top and thicker at the inner end than at the outer end so that the slide will be retained in position in the slot but will project radially more beyond the surface of the body as it is moved longitudinally along the slot toward the outer end. The particular shape of the slot and of the slide are not material, as long as the slide becomes displaced radially more or less as it is moved longitudinally. For the purposes of accurate fitting and cheapness of manufacture, the slot may be formed by cutting away a section of the body and inserting along one side a strip 4 which may

be held in place by screws 5. On the outer edge at the inner end the slide is provided with a thumb piece 6 by means of which the slide can be quickly moved in or out along the slot.

On the surface of the body adjacent to the slot is a zero index mark and on the surface of the slide adjacent thereto a zero mark is made in such a locality that when the slide is moved to such position that the two zero marks coincide, the diameter of the plug through the slide has the exact predetermined dimension of the hole to be gaged. On the slide each side of the zero mark are marks showing the variation from the exact, or as these are termed, marks of "tolerance." After the plug is inserted into an opening that is supposed to be the correct size, the slide is by the thumb pushed out as far as it will go and if the zero marks on the body and on the slide coincide the hole is exact. If the hole is too large the slide goes out too far, and should the hole be too small it does not go out far enough. The variation is indicated by the registration of the respective plus or minus variation marks on the slide with the zero on the body of the gage. If the variation from exact is but slight, for instance if the hole is but .0005 of an inch too small or if for instance it is .001 of an inch too large, the part may be passed as satisfactory. If the movement of the slide shows that the hole varies more than the tolerated limits the piece is rejected.

This tool will instantly and accurately determine whether a hole is exact, or too large or too small and indicate the amount of variation. By turning the part being gaged around on the body and moving the slide back and forth it can be instantly determined whether or not the hole is exactly round or of uniform diameter. As the body of the gage is slightly smaller than the exact size, the pieces can be easily and quickly slipped on and practically the only wear comes on the slide. If the slide wears it is only necessary to move it out a little farther and re-grind it and then change the index mark on the body so that when the slide is in position to indicate the exact measurement the two zero marks will coincide.

The invention claimed is:

1. A plug gage having a cylindrical body with a longitudinal slot the bottom of which slopes from one end to the other, a slide that is thicker at one end than the other and is movable longitudinally in the slot, there being index marks on the body and on the slide that are adapted to register and indicate the amount of radial displacement of the slide as it is moved longitudinally.

2. A plug gage having a cylindrical body with a tapering longitudinal slot, a tapering slide movable lengthwise in said slot, there being index mark on the slide and an index mark on the body, said marks being adapted to register when the slide is in such position that the diameter of the plug through the slide is of the exact predetermined dimension.

3. A plug gage having a cylindrical sectional body with the sections put together so as to leave a tapering slot between them, a tapering slide movable longitudinally in said slot between the sections, there being index marks on the slide and body arranged to register with each other and indicate the lateral displacement of the slide as it is moved longitudinally.

4. A plug gage having a handle, a cylindrical body with a tapering longitudinally extending slot, a tapering slide movable lengthwise in the slot, the inner end of the slide being provided with a thumb piece, there being index marks on the slide and body arranged to register when the slide is moved to such position that the diameter of the gage through the slide is of the exact desired dimension.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."