No. 715,377. Patented Dec. 9, 1902.

J. P. HAYES.

GAGE FOR CUTTERS OR TOOLS.

(Application filed Dec. 16, 1901.)

(No Model.)

Fig. 1.

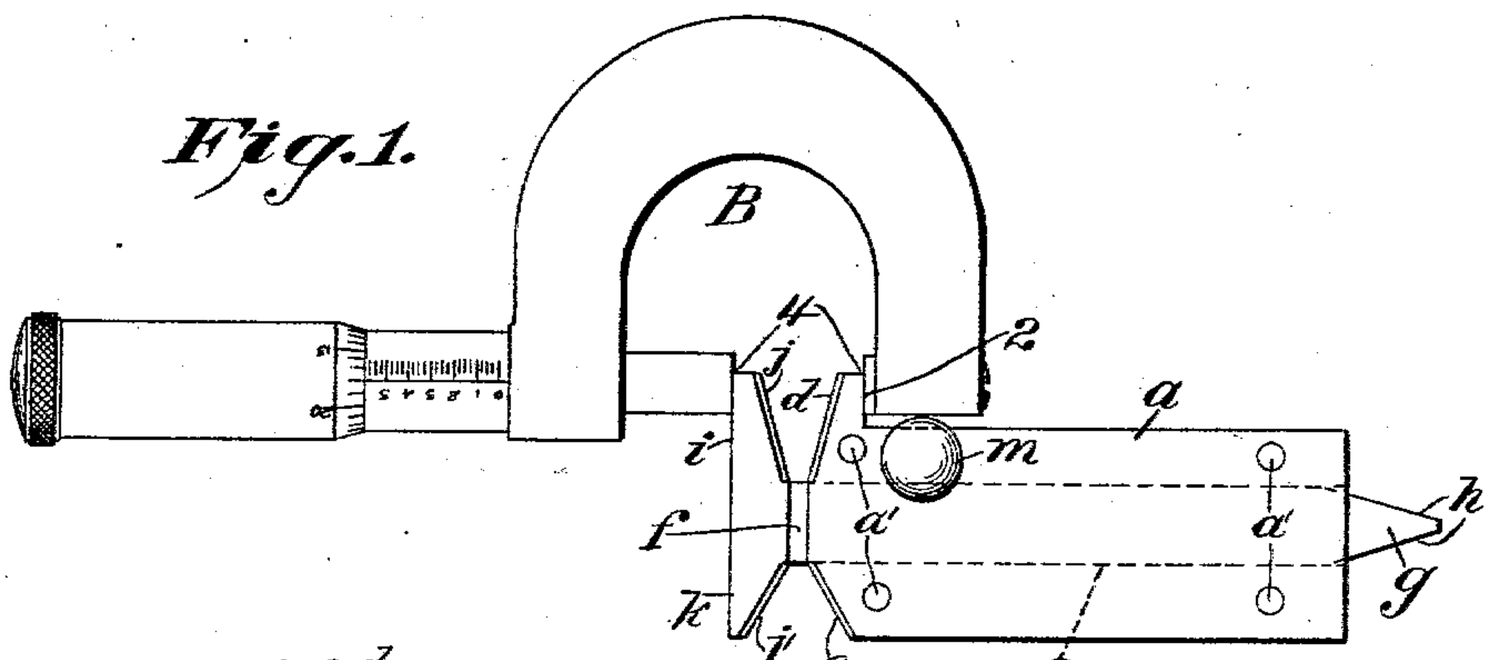


Fig. 3a.

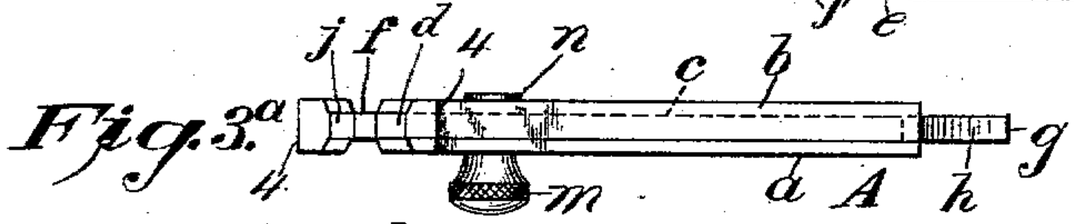
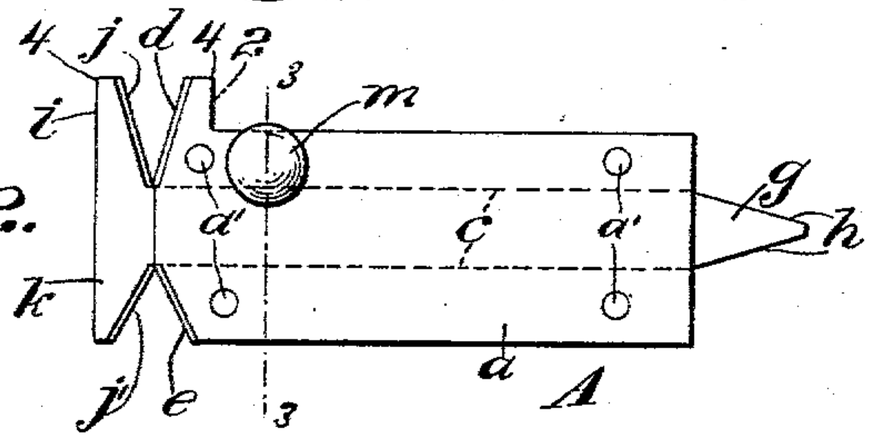


Fig. 2.



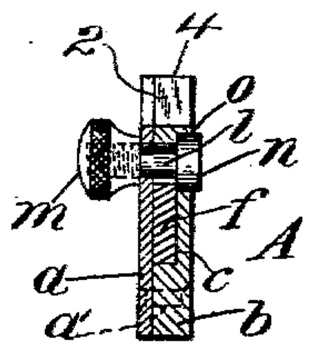


Fig. 3.

Fig. 4.

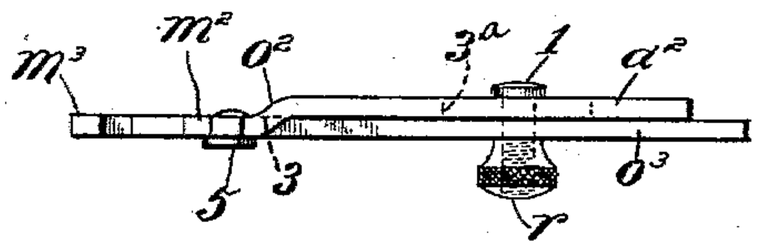


Fig. 6.

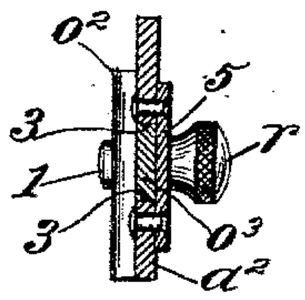
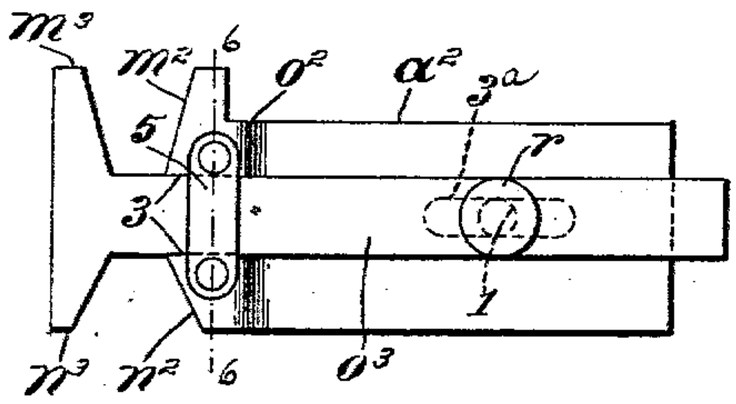


Fig. 5.



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UNITED STATES PATENT OFFICE.

JAMES P. HAYES, OF MERIDEN, CONNECTICUT.

GAGE FOR CUTTERS OR TOOLS.

SPECIFICATION forming part of Letters Patent No. 715,377, dated December 9, 1902.

Application filed December 16, 1901. Serial No. 86,065. (No model.)

To all whom it may concern:

Be it known that I, JAMES P. HAYES, a citizen of the United States, residing in Meriden, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Gages for Cutters or Tools, of which the following is a specification.

This invention relates to gages; and it consists, substantially, in the improvements hereinafter more particularly described.

The invention has reference more especially to gages for measuring or determining the shapes and sizes of the operative portions of tools for cutting or forming angle threads and racks; and the principal object of the invention is to provide a simple and effective device of this kind which may be adjusted or set in accordance with threads or teeth of varying pitch, substantially as will hereinafter more fully appear when taken in connection with the accompanying drawings, in which—

Figure 1 is a side view of my improved gage as applied to an ordinary micrometer or caliper device for ascertaining the width to which the point of the tool or cutter is to be ground for cutting a thread or rack of predetermined angle and pitch. Fig. 2 is a similar view of my improved gage, showing the movable jaws thereof moved or adjusted inwardly, said view being minus the micrometer or caliper device shown in Fig. 1. Fig. 3 is a transverse sectional view taken on the line 3 3 of Fig. 2, and Fig. 3ª is a top or plan view of Fig. 1 minus the calipers. Fig. 4 is a top plan view of a modified form of the gage, and Fig. 5 is a side view thereof. Fig. 6 is a detail transverse sectional view of Fig. 5, taken on the line 6 6 thereof.

Before proceeding with a more detailed description it may be stated that in carrying my invention into effect I provide a stock or body portion which is constructed or provided at one end with a jaw which coöperates with a similar jaw carried at the corresponding end of a shank having longitudinal movement relative to said stock or body portion, and the adjacent edges or faces of said jaws are constructed at any desired angle to each other corresponding to the angle to which the operative edges of the cutter for the threads or racks are to be ground or formed. By adjusting the movable jaw nearer to or farther from the stationary jaw the space or opening between said jaws may be increased or diminished to proportion the width of the end of the cutter or tool to any desired variation of pitch of thread to be cut, and suitable means are employed for securing said movable jaw in any desired position of adjustment thereof.

My invention comprehends also two pairs of stationary and movable jaws with the adjacent edges or faces of one pair constructed at a different angle or inclination to those of the other pair, and in some instances I construct the shank of the movable jaw or jaws in such manner at the tail end thereof as to enable the height or length of the operative edges of the cutting-tool to be determined in exact proportion to the depth of thread or tooth to be formed thereby.

The invention is admirably and especially adapted as a gage for determining the shape and dimensions of tools for cutting or forming threads in accordance with the "Acme" standard, the "United States" standard, and the involute worm-thread, irrespective of the pitch thereof. For convenience of explanation of the present invention the angles of the adjacent edges of the pairs of jaws herein shown are formed in accordance with the standards referred to, and by the employment of suitable mathematical rules or formulas hereinafter given the desired width and height of the operative portion of the tools to be formed may be readily ascertained.

Specific reference being had to the accompanying drawings, and more especially to Figs. 1, 2, and 3 thereof, A represents the stock or body portion of my improved gage or measuring device, preferably constructed of two parts *a b*, riveted or otherwise secured together, as at *a'*, and formed in one side of said part *b* with a longitudinal straight-sided channel or slot *c*, as shown. Said stock or body portion is constructed at the inner end thereof with fine inclined edges or faces *d e* on opposite sides of said channel *c* and disposed at different angles, the said edges preferably being ground off quite sharp and constituting what may be termed the "stationary jaws" of my improved device. Fitting said channel *c* and longitudinally movable therein is a shank or plate *f*, the tail or free end *g* of which may extend or project beyond the corresponding end of stock A in the closed or inward position of the movable jaws, and which

portion of the shank is beveled at the edges *h h* for the purpose to be described. At its opposite end the shank or plate is formed or constructed with jaws *i k*, which are movable therewith, and said movable jaws are inclined or beveled on their adjacent edges or faces *j j'* at corresponding angles to the adjacent edges or faces of the stationary jaws, said edges *j j'* also being ground off quite sharp, as shown. By adjusting the said movable jaws with respect to the stationary jaws spaces or openings may be formed between the jaws of each pair corresponding to the width of the end of the cutting-tool to be formed, it being understood that such width varies in accordance with the desired pitch to be imparted to the thread by said tool. In order to secure the movable jaws in any desired position of adjustment, any suitable device may be employed, which in the present instance comprises a threaded pin *l*, passing through corresponding openings in the parts *a b* of the stock or body and having a tightening-nut *m* thereon, said pin being formed with a head *n*, working in a countersink *o* in the part *b* of the stock and impinging upon one edge of the shank or plate *f* of the movable jaws. In Figs. 1 and 2 it will be observed that the stationary and movable jaws *d i* are extended, as at 2, beyond the corresponding edge of the stock or body portion of the gage to enable the same to be properly fitted to an ordinary micrometer or caliper device, as and for the purpose hereinafter fully explained. It will also be observed that the sides of said jaws in rear of said edges are perfectly straight and at permanent right angles to the longitudinal edges of the stock, by which to enable the gage to be accurately applied between the parts of the micrometer or caliper device, substantially as indicated in Fig. 1.

As shown in Figs. 5 and 6, my improved gage or measuring device is constructed of sheet metal, the part a^2 thereof constituting the body portion and formed at its inner end with stationary jaws having angle edges m^2 n^2, corresponding to the angle edges *d* and *e* of the stationary jaws of Figs. 1 and 2. The said part a^2 is offset at o^2 an extent about equal to the thickness of the metal of which it is formed, and the said jaws are separated by a space 3, so as to accommodate between them the shank o^3 of the movable jaws m^3 n^3, the inner side or surface of said shank being thus made to lie flat against the adjacent surface of said body portion a^2, by which the movable and stationary jaws are brought into alinement or in the same plane. To prevent the shank from coming away from the body portion, a piece 5 is placed across the shank and secured to the body portion, as shown, said piece thus becoming also a part guide for said shank. The said movable jaws m^3 n^3 are held to different adjustments with respect to the stationary jaws by means of a headed screw 1, passing through an opening in the shank and working in a slot 3^a in said body portion a^2, the said screw being provided with a nut *r*, by which the shank o^3 is tightened against the body portion after desired adjustments have been made. I have thus shown several ways of constructing my improved device; but it is evident that I am not limited thereto in any particular whatever.

For the purpose of a better or clearer understanding of the application and operation of my invention I have herein shown the edges or faces of the pair of jaws *d i* to be at an angle of twenty-nine degrees, or the same as the Acme standard thread, while the edges or faces of the pair of jaws *e k* are formed at an angle of sixty degrees, which is the angle of the United States standard thread. The thread of each of these standards has a flat top and bottom, and this necessitates forming the thread-cutting tool with a flat end, which varies in width in accordance with the pitch of the thread to be formed by the tool, as already mentioned. When the distance between the measuring-points 4 4 of the jaws is known, no difficulty whatever is had in at once determining the width and height at which to form a tool for cutting or forming a thread of any given pitch. In the present instance it is assumed that when the movable jaws are moved up close to the stationary jaws, as in Fig. 2, the said measuring-points 4 4 are .500″, or one-half inch, apart, and when the device is thus set or adjusted the tapered end *g* of the shank or plate of the movable jaws projects beyond the end of the body portion its fullest extent or limit, whereas when said measuring-points 4 4 of the jaws are, say, one inch apart the outer flat edge of the said tapered end *g* will be about flush or even with the outer end of the said body portion. This tail end of the shank is for the purpose of ascertaining the height at which to form or grind the operative edges of the cutting-tool and in some instances may be formed, as in Figs. 4 and 5, with the extreme end thereof squared off. The jaws *d i* being on an angle of twenty-nine degrees (Acme standard) and it being desired to form the operative portion of a cutting-tool in accordance therewith to cut a thread three-tenths inches (.3″) apart, or three and one-third ($3\frac{1}{3}$) threads per inch, for instance, the pitch is multiplied by .31, (.3″ × .31=.095″,) which gives ninety-three one-thousandths of an inch as the width at which to form the end of the said cutting-tool. Now inasmuch as the distance between the measuring-points 4 4 of the jaws *d i* is one-half inch minimum, by first setting an ordinary micrometer or caliper device B to .500 (one-half inch) and then adding .093 (width of end of tool) we get .500+.093=.593″ as the width at which to set or bring the measuring-points of the jaws of the gage, or, as is obvious, the micrometer may be set to .593″ in the first instance and the measuring-points of the gage adjusted thereto. Both the desired width and height of the operative por-

tion of the cutting-tool to be formed are thus determined by means of suitable formulas stamped or otherwise applied on the sides of the gage, some slight differences of calculation being resorted to for the height, perhaps, by which to ascertain the points at which to set the gage by the caliper device. In view of the explanations hereinbefore given it is unnecessary to go further into the mathematics involved to enable the construction and operation of the invention to be clearly understood. It may be added that when the pairs of jaws are in the positions indicated in Fig. 2 they correspond with the "Sellers" United States standard thread, which has an angle (included) of sixty degrees, and an Acme standard thread, which has an angle (included) of twenty-nine degrees.

It will be understood that my improved gage may be constructed in a variety of ways by which to present either or both sets of the oppositely-located angular edges or faces which are adapted to be brought into different operative relation for the purposes explained. The gage may also be employed for squaring the tool for the work to be done as any ordinary thread-gage is used.

Without limiting myself to any of the details of the construction and organization of parts, what I claim is—

1. A gage for determining the accuracy of sizes of the operative portions of cutting-tools, comprising a stock provided with jaws having opposite working edges inclined at the same angle to the longer edges of the stock and adapted to be brought to different coöperative relations without variation of such angles, one of said jaws being separable from and supported by the stock and the other integral with the stock, and said stock being offset to bring said working edges into alinement.

2. A gage for determining the accuracy of sizes of the operative portions of cutting-tools, comprising a stock provided with duplicate pairs of jaws having opposite working edges in which those of one set are inclined at the same angle to the longer edges of the stock, and those of the other set similarly inclined at a different angle, the said working edges of both pairs of jaws being adapted to be brought to different coöperative relations without variation of the angles thereof, and one jaw of each pair being separable from and supported by the stock and the remaining jaws being integral with the stock, said stock being offset to bring the working edges of the jaws of each pair into alinement.

3. A gage for determining the accuracy of sizes of the operative portions of cutting-tools, comprising a stock provided with jaws having opposite working edges inclined at the same angle to the longer edges of the stock, and means permitting movement of one of the jaws toward and away from the other without variation of such angles, one of said jaws being separable from and supported by the stock and the other integral with the stock, and said stock being offset to bring said working edges into alinement.

4. A gage for determining the accuracy of sizes of the operative portions of cutting-tools, comprising a stock provided with duplicate pairs of jaws having opposite working edges in which those of one set are inclined at the same angle to the longer edges of the stock, and those of the other set similarly inclined at a different angle and in a different direction, and means permitting movement of a jaw of each pair thereof toward and away from its fellow without variation of the angles of said working edges, and one jaw of each pair being separable from and supported by the stock and the remaining jaws being integral with the stock, said stock being offset to bring the working edges of the jaws of each pair into alinement.

5. A gage for determining the accuracy of sizes of the operative portions of cutting-tools, comprising a stock provided with jaws having opposite working edges inclined at the same angle to the longer edges of the stock and adapted to be brought to different coöperative relations without variation of such angles, and means for securing the jaws to maintain such relations, one of said jaws being separable from and supported by the stock and the other integral with the stock, and said stock being offset to bring said working edges into alinement.

6. A gage for determining the accuracy of sizes of the operative portions of cutting-tools, comprising a stock provided with duplicate pairs of jaws having opposite working edges of which those of one set are inclined at the same angle to the longer edges of the stock, and those of the other set inclined at a different angle to the stock and in a different direction, one jaw of each pair thereof being movable to bring the working edges of both pairs of jaws into different coöperative relations without variation of the angles thereof, and means for securing the movable jaws in different positions, one jaw of each pair thereof being separable from and supported by the stock and the remaining jaws being integral with the stock, said stock being offset to bring the working edges of each pair into alinement.

7. A gage for the purposes described, comprising a body portion having duplicate stationary jaws at one end thereof separated by a space, said body portion being offset a suitable point behind the jaws, a shank or plate fitting the space between said jaws and also having corresponding jaws, means preventing outward movement of the shank or plate, and means for securing the latter in different positions of adjustment.

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