June 4, 1963 R. E. RYAN, JR 3,091,867

THREAD PITCH GAGE

Filed Nov. 30, 1960 2 Sheets-Sheet 1

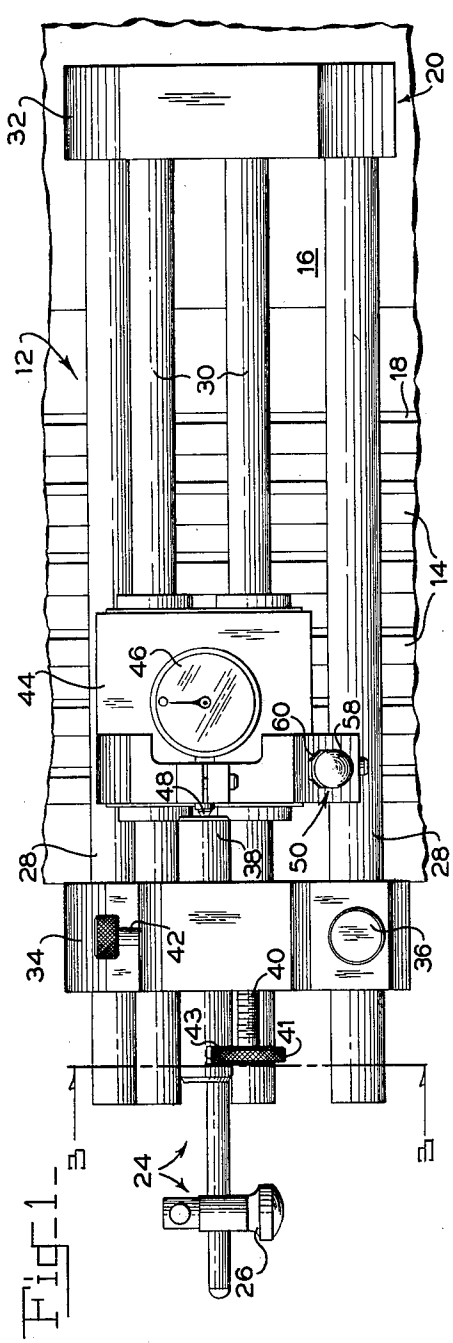


Fig. 1

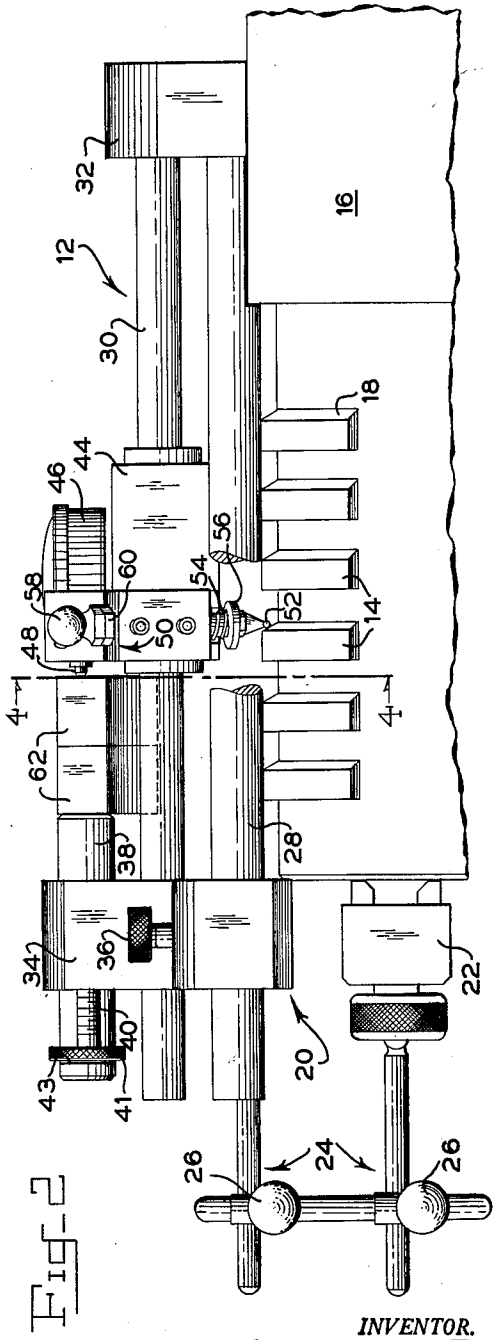


Fig. 2

INVENTOR.
Robert E. Ryan Jr.
BY
S. J. Rotondi & A. J. Dupont

June 4, 1963 R. E. RYAN, JR 3,091,867

THREAD PITCH GAGE

Filed Nov. 30, 1960 2 Sheets-Sheet 2

Fig. 3.

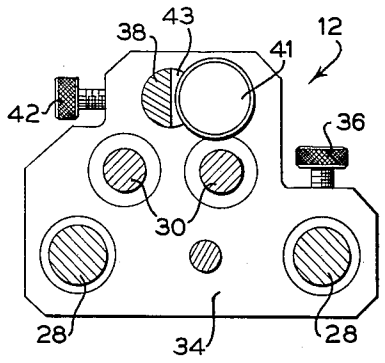


Fig. 4.

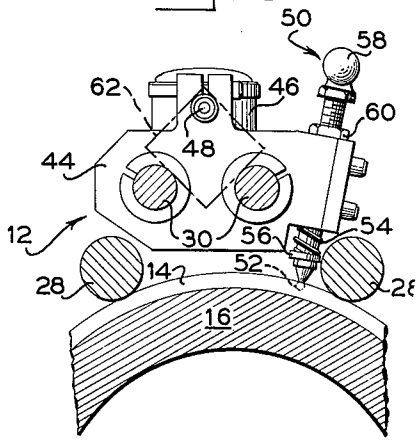


Fig. 5.

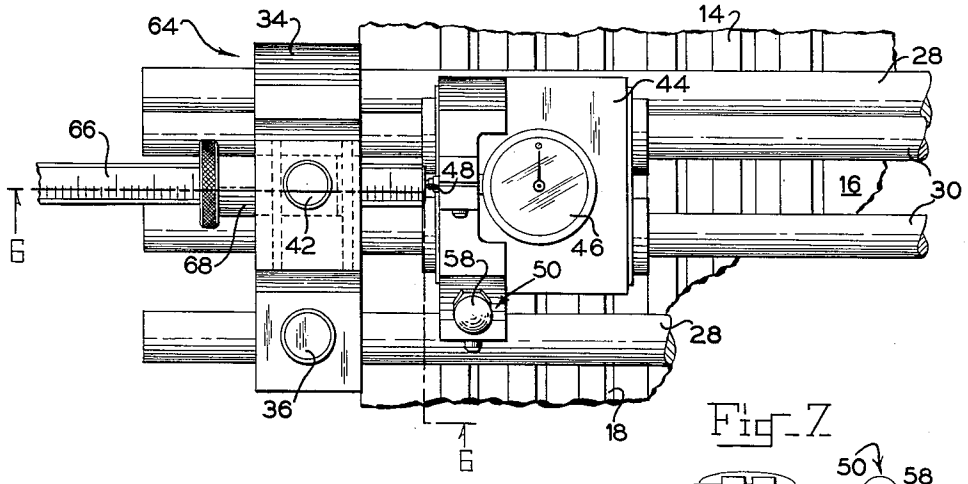


Fig. 6.

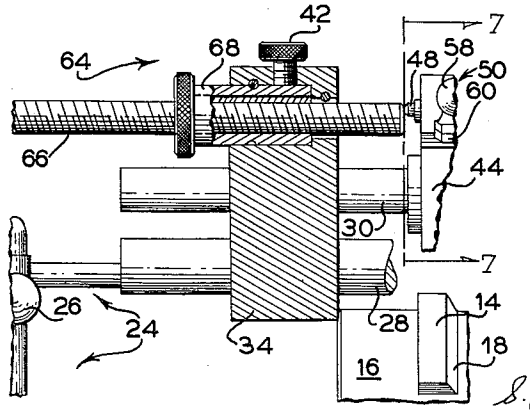
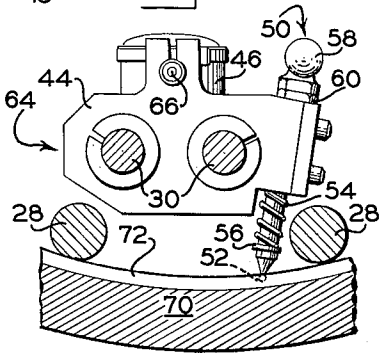


Fig. 7.



INVENTOR.

Robert E. Ryan Jr.

BY

S. J. Rotondi & A. D. Dupont

United States Patent Office

3,091,867
Patented June 4, 1963

3,091,867

THREAD PITCH GAGE

Robert E. Ryan, Jr., Schenectady, N.Y., assignor to the United States of America as represented by the Secretary of the Army

Filed Nov. 30, 1960, Ser. No. 72,815
6 Claims. (Cl. 33—199)
(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by the Government for governmental purposes without the payment of any royalty thereon.

This invention relates to gaging instruments and particularly to gages for checking thread pitch.

In the manufacture of large components, such as the tubes and breechrings for cannons, which are attachable by coarse pitch threads, there has not been previously available any suitable gaging means for checking the pitch of the threads being formed while the component is still mounted on the thread forming machine. This has made it necessary to remove the component from the threading machine and move it to a stationary mounted gaging apparatus generally located within an inspection area. With the weight and size of cannon tubes and breechrings, this is obviously an expensive and time-consuming operation.

It is, therefore, an object of this invention to provide a thread pitch gage which is portable and suitable for gaging thread pitch without removing the threaded component from the thread forming machine.

It is another object of this invention to provide such a portable gage which is adapted for checking the pitch of both external threads, as on a cannon tube, and internal threads as in the breechring of a cannon.

The specific nature of the invention as well as other objects and advantages thereof will clearly appear from a description of a preferred embodiment as shown in the accompanying drawings in which:

FIG. 1 is a top view showing the gage of this invention mounted on a cannon tube with the carriage positioned for zeroing the dial indicator;

FIG. 2 is a side view of the gage mounted to the cannon tube and the carriage positioned for inspecting the lead of the third thread from the rear end of the tube;

FIG. 3 is a view taken along line 3—3 of FIG. 1;

FIG. 4 is a view taken along line 4—4 of FIG. 2 with one of the gage blocks shown in phantom;

FIG. 5 is a top view of an alternate embodiment of the gage;

FIG. 6 is a view taken along line 6—6 of FIG. 5; and

FIG. 7 is a view taken along line 7—7 of FIG. 6 and shows the gage mounted in a breechring for checking the internal threads therein.

Shown in FIGS. 1–4 is a gage 12 for checking the pitch of threads 14 formed externally on the breech end of a cannon tube 16. Threads 14 are of modified buttress type with an inclined flank 18 facing the muzzle or front end of tube 16. Gage 12 includes a saddle 20 which is mountable on tube 16 for contact with the major diameter surfaces of the threads along the length thereof. Saddle 20 is held in a selected position on threads 14 by a magnetic anchor 22 through the cooperation of a connecting linkage 24. Linkage 24 is provided with swivel joints having conventional adaptors, as shown at 26, which may be tightened against the joints to make the linkage immovable after saddle 20 is properly positioned, as hereinafter described, on threads 14.

Saddle 20 includes a pair of contact-rods 28 and a pair of guide-rods 30. Contact-rods 28 and guide-rods 30 are each secured at the forward end, respective to the direction of tube 16, by a retainer block 32 and at the opposite end by a housing 34 suitably bushed for slidingly receiving the rods so that the housing is slidable therealong without radial displacement. A screw 36 is threadingly disposed in housing 34 so as to be actuatable against one of the contact-rods 28 for securing the housing thereto.

Contact-rods 28 and guide-rods 30 are supported by retainer block 32 and housing 34 so that each of the rods is parallelly disposed relative to the others. Thus, when saddle 20 is placed upon threads 14 with contact-rods 28 in angularly spaced contact therewith, guide-rods 30 are automatically aligned with the longitudinal axis of the threads. The base of housing 34 is arranged to extend sufficiently below contact-rods 28 so as to be contactable with the rear face of tube 16, when the contact-rods are in contact with threads 14, whereby gage 12 is indexable longitudinally respective to threads 14. Linkage 24 is connected to saddle 20 at housing 34 so that after adaptors 26 are tightened, the housing is held immovable respective to tube 16.

An indexing plunger 38 is mounted through housing 34 symmetrical to and slightly above guide-rods 30 and is disposed for sliding displacement parallel thereto. An adjustment screw 40 with a knurled head 41 is mounted on the rear end of housing 34 so that such head extends into a mating chordal recess 43 in plunger 38 to transfer the longitudinal component of movement of the screw to the plunger for adjustable displacement thereof. A locking screw 42 is provided in housing 34 so as to be actuatable against plunger 38 to secure the plunger in an adjusted position.

Mounted on guide-rods 30 is a carriage 44 having suitably bushed holes disposed longitudinally therethrough for slidingly receiving the guide-rods without radial displacement. Carriage 44 carries a dial indicator 46 having a pointer actuating pin 48 which extends rearwardly so as to be contactable by the front end of plunger 38. Carriage 44 also carries a probe 50 which extends downwardly through the carriage so that a contact point 52 terminating the lower end of the probe is contactable with flank 18 of the threads 14. Probe 50 is biased downwardly to press contact point 52 against flank 18 by a spring 54 disposed between the underside of carriage 44 and an annular flange 56 on the probe. The upper portion of probe 50 is threaded to provide means for mounting a terminal knob 58 whereby the probe may be raised manually to an elevated position. A lock nut 60 is mounted on the threaded portion of probe 50 between knob 58 and the top of carriage 44 to provide means for adjusting the normal, extended position of contact point 52.

Carriage 44 is positioned along saddle 20 so as to gage the pitch of the different threads 14 by the incremental addition of master gaging blocks 62 to the saddle between pin 48 and plunger 38. The gaging blocks 62 are substantially square in configuration with the diagonal distance thereof being greater than the distance between the guide-rods 30 so that adjacent sides of the gaging blocks will rest upon the guide-rods when the corner formed by the sides is inserted between the guide rods, as shown in phantom in FIG. 4. Thus, the gaging blocks 62 (FIG. 2) are interposed between plunger 38 and pin 48 so as to be jointly contactable thereby. The thickness of each gaging block 62 is equal to the prescribed pitch of each of the threads 14.

To gage the threads 14 for correctness of pitch at each turn, gage 12 is mounted on tube 16 so that contact-rods 28 contact the threads along the length thereof. Housing 34 is then slid along contact-rods 28 and guide-rods 30 until the front end of the housing is in contact with the rear face of tube 16. When gage 12 is correctly positioned, magnetic anchor 22 is placed on the rear face of tube 16 and adaptors 26 are tightened to lock linkage

24 at the swivel joints thereof against movement. Probe 50 is adjusted in height so that contact point 52 thereof contacts one of the threads 14 about half-way down flank 18, which is normally the location of the pitch diameter of the thread, and lock nut 60 is then tightened to hold the probe in the adjusted position.

Carriage 44 is moved along guide-rods 30 towards housing 34, after probe 50 is raised by knob 58 so that contact point 52 clears the major diameter surface of the threads 14. When contact point 52 is located above the space between the first two threads 14, probe 50 is released so that the contact point is contactable with flank 18 of the first one of the threads. Contact point 52 is held against flank 18 of the first one of the threads 14 while plunger 38 is adjusted by set screw 40 to contact the end of pin 48 of dial indicator 46. Plunger 38 is then actuated against pin 48 until dial indicator 46 registers zero whereupon locking screw 42 is tightened against the plunger so as to be held in the adjusted position.

When dial indicator 46 is zeroed, probe 50 is elevated so that carriage 44 can be moved to align contact point 52 with the space between the second and third threads 14 and released thereinto. A gage block 62 is laid on guide-rods 30 in contact with plunger 38 and carriage 44 is moved rearwardly until contact point 52 contacts flank 18 of the second one of the threads. The variation, if any, between the prescribed and actual pitch of the second one of the threads 14 is read directly from dial indicator 46. This procedure is continued, adding another gage block 62 as each additional thread 14 is gaged, until the pitch of all of the threads are checked.

Shown in FIGS. 5–6 is a gage 64 which is essentially similar to gage 12 except that instead of using gage blocks for measuring the pitch of threads 14, plunger 38 is replaced by a calibrated shaft 66 which is actuatable longitudinally by a threaded collar 68 so that the shaft may be moved toward carriage 44 the prescribed pitch distance, as indicated thereon, as threads 14 are progressively gaged.

In FIG. 7, gage 64 is shown mounted in a breechring 70 for checking the threads 72 formed internally therein, in the same manner as described for checking the external threads 14 on tube 16.

From the foregoing it is clearly apparent that there is provided herein for checking the pitch of threads, a gage which is easily carried to the component being checked and mounted thereto and which is simple and rugged in construction and is also accurate in its gaging as it has a repeat accuracy within .0002 inch.

Although a particular embodiment of the invention has been described in detail herein, it is evident that many variations may be devised within the spirit and scope thereof and the following claims are intended to include such variations.

I claim:

1. A portable gage adapted for checking both the external threads formed on the breech end of a cannon tube and the internal threads formed within a breechring, the gage including a pair of contact-rods, a pair of guide-rods, a retainer block for securing one end of each said contact-rods and guide-rods, a housing for supporting the opposite ends of said contact-rods and guide-rods so as to permit relative sliding displacement of said housing along said contact-rods and guide-rods, said contact-rods and guide-rods being retained by said retainer block and housing so as to be disposed parallel relative to each other and so that said contact-rods are contactable with the major diameter surface of the external threads on the tube and the minor diameter surface of the threads in the breechring whereby said guide-rods are disposed parallel

to the longitudinal axis of the contacted threads, means for securing said housing to the tube, a carriage disposed for sliding displacement on said guide-rods, means for indexing said carriage to successive ones of the threads contacted by the gage, master means disposed between said housing and said carriage for representing the prescribed pitch of the one of the threads to which said carriage is indexed, and a dial indicator carried by said carriage, said dial indicator being disposed for contact with said master means for indicating any difference between the actual pitch of the thread to which said carriage is indexed and the prescribed pitch.

2. The gage as defined in claim 1 wherein said means for indexing said carriage to successive ones of the threads includes a probe, a point terminating one end of said probe, said probe being slidingly disposed through said carriage for positioning said point so as to be contactable with one side of the threads, a spring disposed between said carriage and said point for biasing said point to an extended position while permitting retraction thereof to clear the threads for contact with successive ones thereof, and means for adjusting the extended position of said probe so that said point is normally contactable with the side of the threads between the major and minor diameter surfaces thereof.

3. The gage as defined in claim 1 wherein said master means includes a plurality of gage blocks each having a thickness equal to the prescribed pitch, said gage blocks having a square configuration so as to be insertable diagonally between said pair of guide-rods for retention thereby between a pointer actuating pin of said dial indicator and said housing.

4. The gage as defined in claim 1 wherein said master means includes a shaft slidingly mounted through said housing in longitudinal alignment with a pointer actuating pin of said dial indicator, said shaft being provided with calibrations for indicating the degree of extension of said shaft towards said dial indicator, and a collar threadingly cooperating with said shaft for selective displacement thereof towards said dial indicator in increments of the prescribed pitch.

5. The gage as defined in claim 1 wherein said dial indicator is provided with a pointer actuating pin extending towards said housing, and including a plunger slidingly disposed in said housing parallel to said guide-rods and in longitudinal alignment with said pointer actuating pin, means for moving said plunger into contact with said pointer actuating pin when said carriage is indexed to the first one of the threads to zero said dial indicator, and means for locking said plunger against displacement when said dial indicator is zeroed thereby.

6. The gage as defined in claim 5 and including a plurality of gage blocks each having a thickness equal to the prescribed pitch distance, said gage blocks being disposed for support by said guide-rods and for incremental addition between said plunger and pointer actuating pin as said carriage is progressively indexed with the threads to represent the prescribed pitch for each thereof.

References Cited in the file of this patent

UNITED STATES PATENTS

1,357,588	Peck	Nov. 2, 1920
1,359,943	Wilhelm	Nov. 23, 1920
2,321,903	Fox	June 15, 1943
2,542,030	Hoppe	Feb. 20, 1951

FOREIGN PATENTS

390,920	Germany	Feb. 26, 1924