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Gages for Mechanical Locking

IN ORDER to provide a simple and easy standard method of checking and maintaining tolerances in mechanical locking, the Signal Advisory Committee, C. & O.-Erie-N.Y.C. & S. L.-P. M., has developed a complete set of gages for the various types of machines now in general use. These gages are of two kinds, the staff type for use on mechanical interlocking machines and Model-2 electric machines, and several protractor types for use on Model-14, Model-S-8, Style-TC and Type-A machines.

Staff Type

The gage developed for checking the locking tolerances on mechanical machines and Model-2 electric machines consists of a knob-headed rectangular staff approximately 10 in. in length, to which two slides, approximately 4 in. in length, are attached by means of two small rectangular guides. The slides, which have lugs extending on each end, are placed opposite each other on the broad sides of the staff with the lugs extending outward. One of the rectangular guides, which completely enclose the staff and both slides, is fastened to the staff, approximately 3¾ in. from its lower end, by means of a machine screw, while the other guide is fastened, by brazing, to one of the slides at its lower end. The slide which is free to move in both guides is graduated at its lower end to form an easily readable scale. A spring, capped at each end by a brass ferrule, is inserted between the two slides, in a hole in the staff, just below the upper guide. The guides, slides and staff are so machined that smooth movement of the slides results. The spring between the slides serves to maintain a comparatively tight fit and to preserve the slides in position once they are set. Detailed descriptions of the various parts of this gage are given in Fig. 1, the major portion of its construction being of stainless steel.

To check whether the lost motion is too great in the locking bed and connections of a mechanical interlocking machine, one lever is locked by the lever against which it is to be checked and the latch is lifted as far as possible, as illustrated in Fig. 2. With both slides pushed down to the end of the gage and with the gage parallel to the latch rod, lug A of the graduated slide is placed on top of the latch rod projection and the staff is pushed down until the end rests on top of the quadrant. This action forces both slides up through the upper guide since the non-graduated slide is brazed to the lower guide which is forced up by lug A.

When this is accomplished, the locking against the lever is released by operation of the lever against which it is being checked. The gage is removed and the latch is raised again so that it just rests on the quadrant, as illustrated in Fig. 3. Following this, the gage is again put into position. This time, however, lug B, rather than lug A, is placed on top of the latch rod projection and the staff is pushed down until the end rests on the top of the quadrant. Care must be taken that the graduated slide remains in the position with reference to the staff in which it was placed by the first operation.

During the second operation lug B and its associated guide will rise as the staff is pushed down against the quadrant. The difference between the position of the guide attached to B in Fig. 2 and in Fig. 3, as read on the scale on the graduated slide, is the distance between the bottom of the latch rod with all slack in the locking and connections taken up and the top of the quadrant. By specifying a minimum for this distance, a specification for maximum allowable tolerance for the locking will be effected. As used, a minimum scale reading of ⅜ in. is specified.

The staff gage is also used with

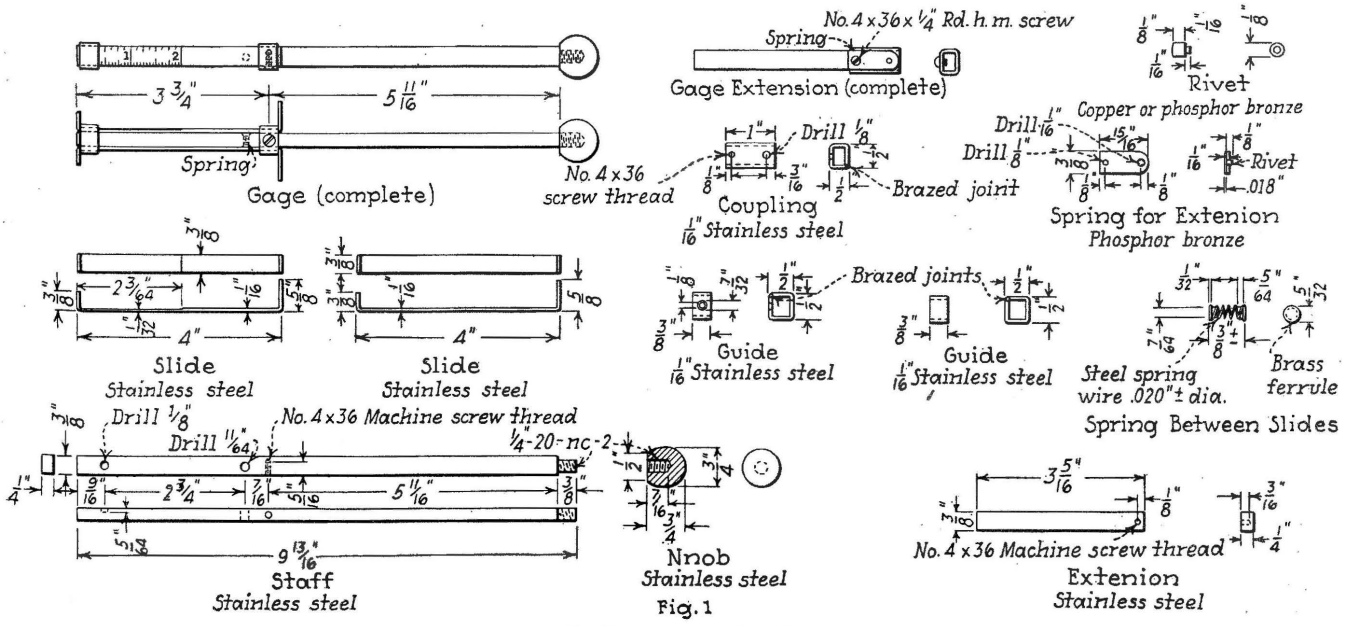

Fig. 1

Staff type gage details

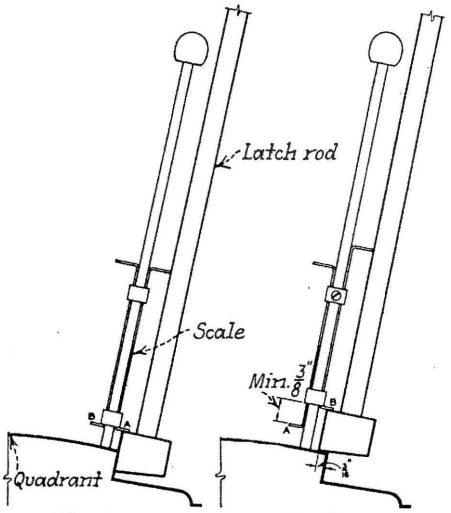

Fig. 2 Fig. 3

Use of gage on mechanical machine

the Model 2 electric machine. To check whether the lost motion is too great in the locking bed and connections of this type of machine with the lever in the normal position, the lever is first locked by the lever against which it is to be checked, and the gage, with both slides pulled toward the knob, is placed parallel to the lever with the end against the machine, as illustrated in Fig. 4. Both slides are then pushed down until lug B rests against the lever, lug A resting tight against the guide which is brazed to the non-graduated slide at lug B. The lever is then pulled out as far as possible so that all lost motion is taken up, as illustrated in Fig. 5. The distance the movable guide travels as read on the graduated scale near lug A represents the slack in the locking bed and connections. The roads specify a maximum of 3/16 in. for this reading.

To check with the lever reverse, the lever is first locked by the lever against which it is to be checked and is then moved toward the normal position as far as it will go. In other words, the lost motion is first taken up by movement of the lever towards normal. The staff gage is then placed in position parallel to the lever, with its end resting against the machine. Both slides are then pushed down until lug D rests against the lever, lug A resting tight against the guide which is brazed to the non-graduated slide at lug B. This is illustrated in Fig. 6. The lever is then pulled out as far as possible, as shown in Fig. 7. With this movement, the guide which is brazed to the non-graduated slide moves out, lug A remaining fixed, and the distance the guide moves as read on the graduated scale is a measure of the lost motion. The roads specify a maximum of $\frac{7}{16}$ in. for this reading.

On some machines on which cabinets have been changed, it may be necessary to use lug D instead of lug A in obtaining readings in the normal position, and to design and use a gage extension, similar to that illustrated in the detailed drawings of Fig. 1, in order to obtain readings in the reverse position.

Protractor Type

The gage developed for checking the locking tolerances of Model-14 and S-8 machines is illustrated in Fig. 8. It consists of a transparent celluloid type protractor with degree lines, letters, and numbers stamped into the face of the celluloid and colored white. The edges of the celluloid are cut and shaped so that the protractor will fit snugly behind the lever to be checked, and against other portions of the machine, without interfering with the operation of adjacent levers. With this type of gage, the lost motion is measured in degrees, a suitable scale being provided for use with either the Model-14 or S-8 machine. For example, after having locked the lever by the lever against which it is being checked, a reading is taken with the lever in the normal position, and again with the lever moved sufficiently toward reverse to take up all the lost motion in the locking. The difference in the two readings represents the amount of lost motion in the locking and connections, for which a certain safe standard maximum may be specified. The Erie specifies a maximum of five degrees for Model 14 machines and a maximum of five degrees for S-8 machines. It will be noted that the gage must be used both with the scale designations right side up and upside down with the Model-14 machine, depending upon the quadrants through which the lever being checked moves.

A protractor for use on Type-A machines is illustrated in Fig. 9. Its use is similar to that of the protractor described above, although the scale and configurations are different, depending upon the physical characteristics of the machine to which it is to be applied. On the Type-A machine, the roads specify a maximum scale reading of five degrees.

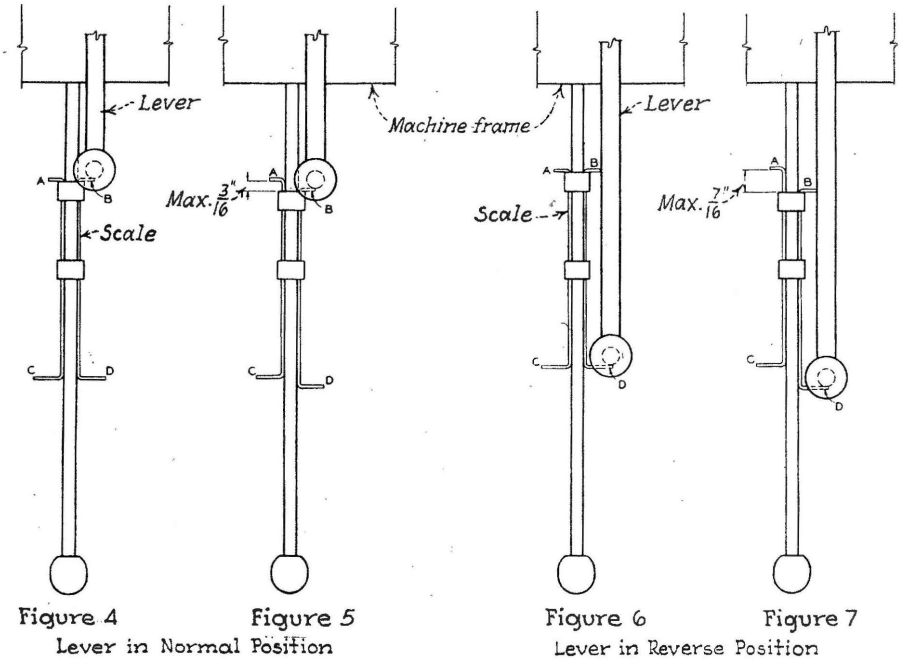

Figure 4 Figure 5 Figure 6 Figure 7

Lever in Normal Position Lever in Reverse Position

Application of staff gage to electric machine

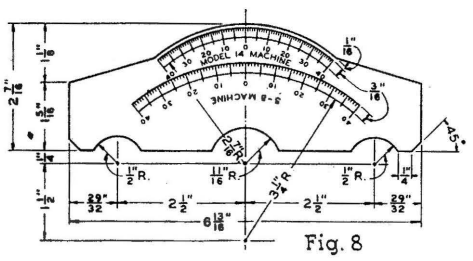

Fig. 8

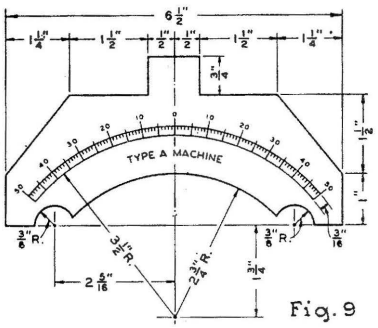

Fig. 9

Protractor type gage details