(No Model.) 2 Sheets—Sheet 1.

J. M. SEYMOUR.

MECHANISM FOR ADJUSTING RODS OR PITMEN OF DIE PRESSES.

No. 284,910. Patented Sept. 11, 1883.

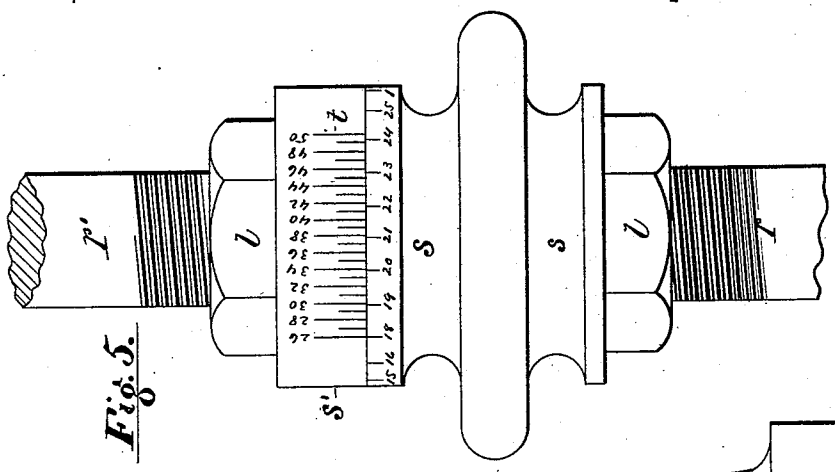


Fig. 5.

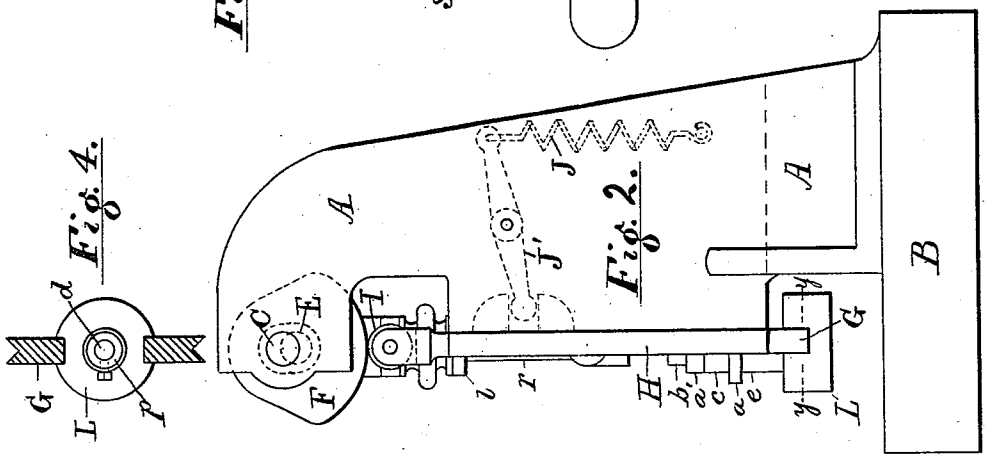


Fig. 4.

Fig. 2.

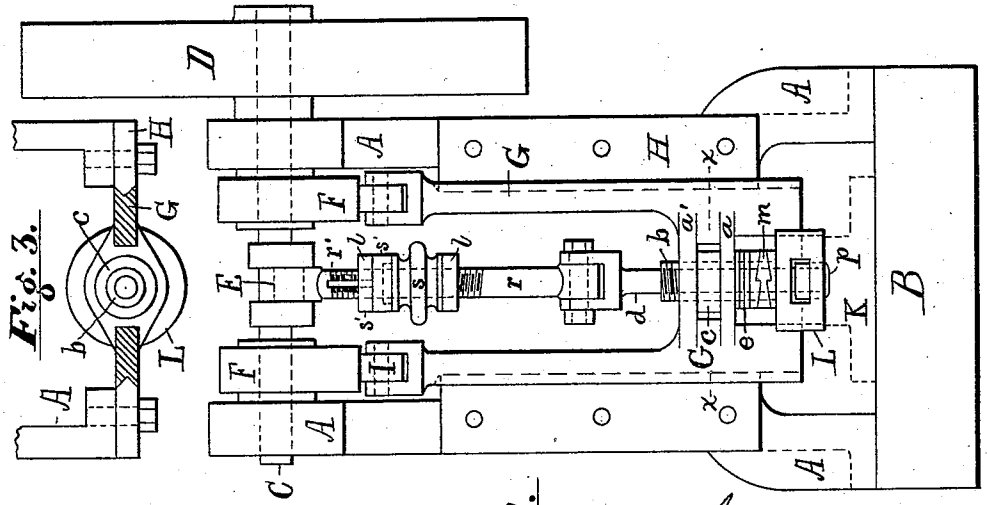


Fig. 3.

Fig. 1.

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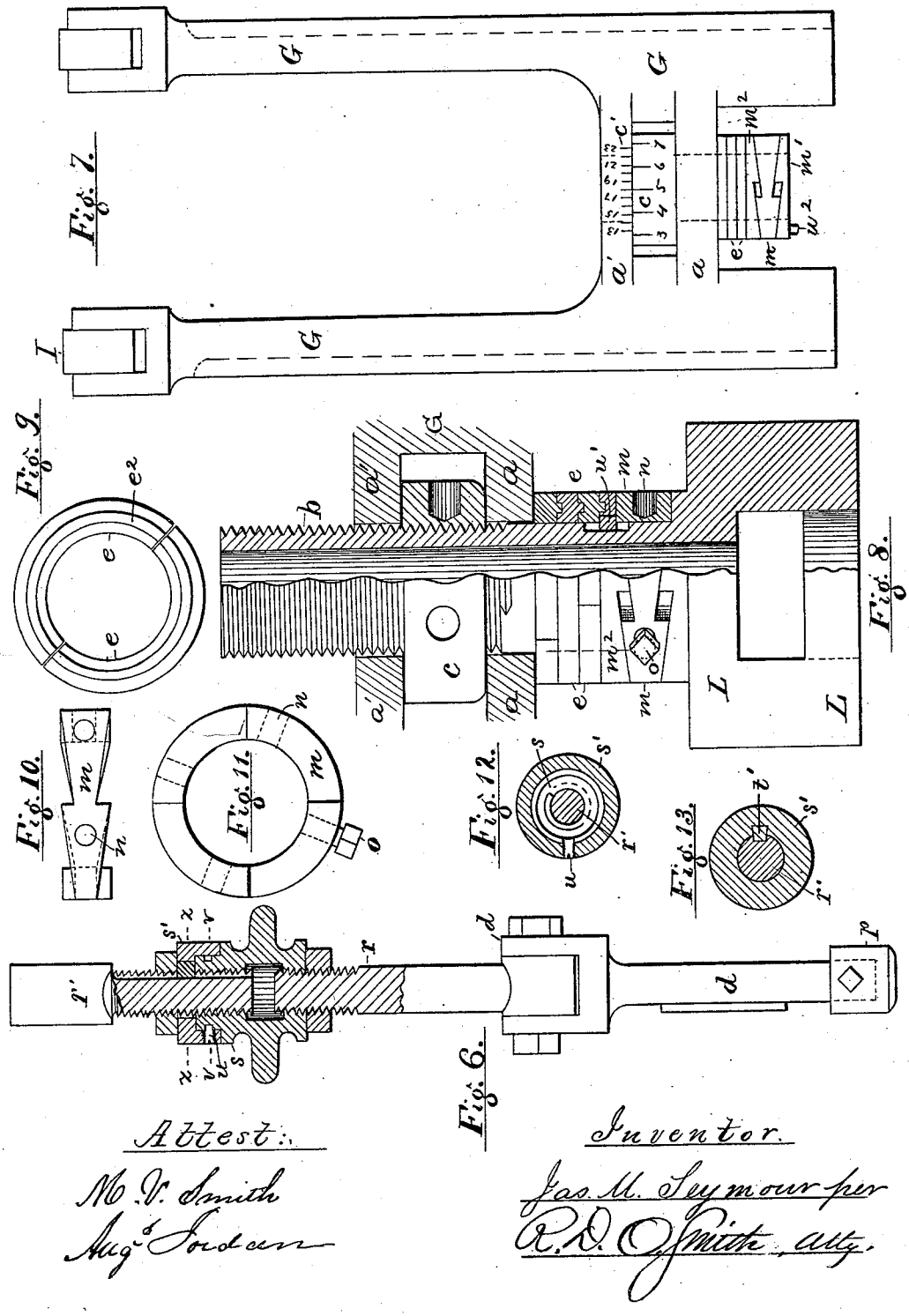
N. PETERS. Photo-Lithographer, Washington, D. C.

(No Model.) 2 Sheets—Sheet 2.

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MECHANISM FOR ADJUSTING RODS OR PITMEN OF DIE PRESSES.

No. 284,910. Patented Sept. 11, 1883.



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UNITED STATES PATENT OFFICE.

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MECHANISM FOR ADJUSTING RODS OR PITMEN OF DIE-PRESSES.

SPECIFICATION forming part of Letters Patent No. 284,910, dated September 11, 1883.

Application filed April 16, 1883. (No model.)

To all whom it may concern:

Be it known that I, JAMES M. SEYMOUR, a citizen of the United States, residing in Newark, Essex county, New Jersey, have invented certain new and useful Improvements in Differential-Scale Adjustments Applied to Double-Acting Presses, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This improvement relates to the differential scale for adjusting machine-tools, patented to me April 24, 1883, and to the adaptation of said differential-scale adjustment to that class of power-presses wherein the adjustments are produced by varying the lengths of the connecting-rod. In this class of presses there is commonly at the top of the frame a transverse shaft bearing a crank, and a connecting-rod carried by said crank, that has attached to its lower end a punch or ram, whereby the metal to be worked is forced into a die secured to the bed of the press. The various descriptions of current work require the punch and die to be changed frequently, and from time to time the same punch and die are replaced upon the press. No two punches or dies will be of exactly the same dimensions, and it is therefore necessary to lengthen or shorten the connecting-rod each time the punch and die are changed. The connecting-rod is therefore made in two parts united by a sleeve, into the opposite end of which the several parts of the connecting-rod are screwed. In order to obtain adjustment of the connecting-rod as to length, by revolving the sleeve, these screws are either right and left hand or are differential, and, as may be readily understood, it is a delicate and difficult matter to obtain proper adjustment. This subject, in its general aspect, has, however, been described in my patent of April 24, 1883, and it is not proposed herein to claim, broadly, my method of obviating all difficulty in restoring any adjustment after having once obtained it. The particular method described in my patent above mentioned requires modification to adapt it to presses of the description herein shown, and this improvement has reference to such modification and adaptation, and will be fully understood by the particular description hereinafter.

In the ordinary double-acting presses the blank of sheet metal is laid upon a concave die, and is first clamped thereon by a ring pressed upon its margin, and then forced into the desired shape by forcing a suitable punch through the aperture in the press-ring into the die. To afford a passage for the punch through the center of the press-ring the latter has usually been connected with its driving-cam by a separate frame having screw-rods or other adjustable connections placed at its sides, and great difficulty has always been experienced in adjusting these various connections to press the ring equally upon all sides of the sheet-metal blank. It is obvious that if the pressure upon the blank is not equal on all sides it will slip at the side of the least pressure, and that if gripped too hard it will be torn instead of drawing down into the die with the punch. The only resource heretofore has been to tighten one after another the adjusting-screws, and the result has been sometimes to damage some of the blanks in trials to determine the exact adjustment. My invention affords a means of adjusting the press-ring, in its descent upon the die, by a single central adjusting-screw, which is made tubular to afford the necessary passage for the punch-rod through its center.

My invention also includes a peculiar locking apparatus applied to the central adjusting-screw of the press-ring, whereby the pressure is entirely removed from the thread of the screw on the connecting-rod, and may be almost wholly transferred to the surrounding rings and nuts.

The nature of my construction will be understood by reference to the annexed drawings, in which—

Figure 1 represents a front view, and Fig. 2 a side view, of a double-acting press adapted to draw watch-cases. Fig. 3 is a horizontal section of the cross-head on line *x x* in Fig. 1, and Fig. 4 is a similar section on line *y y* in Fig. 2. Fig. 5 is a detached view enlarged on the exterior of the adjusting-nut upon the punch-rod. Fig. 6 is a detached view of the entire punch-rod, the adjusting-nut being shown in section; and Fig. 7 is a detached view of the cross-head and a portion of its attachments. Fig. 8 is an enlarged view of the

press-ring and its adjustment-nut and locking device, the right-hand side being shown in section. Fig. 9 is a detached view of one packing-ring in plan. Fig. 10 is an edge view, and Fig. 11 is a plan view, of the central locking-collar. Fig. 12 is a section of the vernier-collar on the line *z z* in Fig. 6, and Fig. 13 a section of the same on line *v v* in the same figure.

A is the frame of the machine, formed of two stanchions supported upon a base, B, and carrying in its top a cross-shaft, C, having a driving-pulley, D. The shaft is provided with a central crank, E, for working the punch, and with a cam, F, at each side of the crank to operate the press-ring. The latter is adjustably carried in the cross-head G, which is fitted to slides or guides H, provided upon the stanchions of the frame A, and is moved toward the die K, which is shown in dotted lines merely, upon the bed B by the cams F pressing upon rollers I, fitted in the upper extremity of the cross-head. The cams are constructed with a concentric segment on their periphery, to hold the press-ring at rest upon the die during the drawing operation, and operate by their rotation to give the cross-head a uniform, positive stroke.

The punch-spindle is formed with a forked head, *d'*, to which is jointed a connecting-rod, *r r'*, which carries the motion of the crank E to the punch. Upon this connecting-rod is applied an adjusting-nut *s*, fitted to right and left hand or to differential threads upon the ends of the two sections *r r'*, of which the rod is formed. A sliding index-collar, *s'*, carrying a differential scale, *t*, is applied to the upper section, *r*, and is kept from turning by a key, *t'*, fitted into a keyway cut in the section *r'*. The nut *s* is formed with a flange of the same diameter as the collar, and is marked with divisions and numbers, as shown in Fig. 5, to indicate its relation to the screw upon which the collar *s'* is placed. It is also movably secured to the collar by a groove and set-screw, *u*. The object of this construction is to enable the operator to restore at any future time the same adjustment of the punch and die as had been formerly used, as described in my patent on differential indexes, above referred to. The periphery of the nut *s* at its edge adjacent to the collar *s'* is marked with any desired number of equal divisions. In practice I have, for convenience, employed twenty-five divisions consecutively numbered, as shown. A differential graduation is applied to the adjacent edge of the collar *s'*. I have found it convenient to divide *s'* into twenty-four equal divisions, and to subdivide each of said divisions into four equal spaces. Thus I obtain ninety-six divisions on *s'* and twenty-five on the nut *s;* but the collar *s'* being non-rotating, there is no necessity to continue the graduations entirely around it, because only that portion at the front of the press will be employed. I therefore select a suitable portion of said differential scale—say about one-fourth—and number its graduations consecutively from twenty-six, say, up to fifty, and then there will not be any duplication of numbers used in recording the adjustment. The cross-head is held up against the cams by a spring, J, and lever J', fitted inside one of the stanchions of the frame, and the press-ring is attached to the cross-head in such manner as to share its positive motion, and yet be adjustable toward the die K. To effect such adjustment the press-ring L is formed with a tubular shank, *b*, which is fitted to two transverse bridges, *a a'*, formed as ties across the bottom of the cross-head. A nut, *c*, is fitted to a thread upon the shank *b*, and to the space between the two bridges *a a*, and its rotation thus serves to move the shank and ring L as required.

Between the press-ring and the lower bridge, *a*, is shown a locking device for removing the strain from the thread of the nut *c* and transferring it to large annular plates after the screw adjustment of the shank has been effected. Rabbeted collars *e* are also shown for packing up larger spaces than the locking-collar can fill. These collars are shown in plan in Fig. 9, and consist of washers formed with a groove, e', upon one side, and an annular tongue, e^2, upon the other, to hold them in place, and bisected to place them readily upon the shank beneath the bridge *a*. The locking-collar consists in a collar, *m*, formed with spiral faces, and operated in contact with similar spiral faces, *n n*, formed upon the upper side of the press-ring.

In Fig. 8 the shank *b* is shown in its plan, and provided with the nut *c* and collars *e* and *m*, the latter being provided with a set-screw, *o*, as shown in Fig. 11, to hold it in any desired position. It is obvious that the turning of the collar *m* cannot move the shank any farther than the lost motion of the nut *c* will allow, as the latter is fitted closely between the bridges *a a'*, but that the pressing of the spiral faces together serves to crowd the washers *e* firmly against the bridge *a*, and to interpose a series of collars in solid contact between the cross-head and press-ring L. Holes *n* are formed in the edge of the collar *m*, by which it can be turned at pleasure, and the divided collar *e* can be removed when adjusting the nut *c*, and one or more of them then inserted above the collar *m*, before tightening the latter.

The press-ring is constructed of annular form, connected, as shown in Fig. 8, with the shank *b* by a top plate which closes the central opening, into which the punch is retracted before pressing the blank; and the shank is formed with a hole through it for the passage of the punch-spindle *d*, upon the lower end of which the punch *p* is secured by a set-screw. (Shown in Figs. 1 and 4.)

To facilitate the setting of the press-ring the nut *c* is also shown provided in Fig. 7 with a series of divisions and numbers to indicate the

adjustment of the shank as employed at any former time, the bridge *a'* being provided with a vernier or other scale, *c'*, adapted to compare with the marks upon the nut *c*, which is made smooth for such purpose, and provided with holes for turning it, like the collar *m*.

The method of using my invention is as follows: The operator sets the die K in its place and adjusts the punch by turning the nut *s* to penetrate the proper distance therein. The blank is then laid upon the die, and the cams F being turned to lower the cross-head G, the press-ring is adjusted to clamp the blank with the desired pressure by means of the nut *c*. Such adjustment being made, the locking-collar *m* is then supplied with as many of the washers *e* as can be inserted above it, and is turned around, by a rod inserted in the holes *n*, until the spiral surfaces are forced into close contact. The turning of the set-screw *o* then holds the collars *e* and *m* all firmly in place and prevents the loosening of the same while in work. When the punch and press-ring are properly adjusted, the numbers of the coincident marks upon the nuts *c* and *s* are noted, and if recorded for future reference enable the operator to quickly restore the exact adjustment had before, the height of the die serving to indicate the approximate turn of the nut *c* or *s*, whichever may be used in setting either the punch or the ring L.

The differential scale upon the bridge *a* and collar *s'* are made differently from those I have described in my patent of April 24, 1883, and avoid the use of an entire circle of marks upon the opposite differential scale. I thus enable the operator to read all his indications from the front of the cross-head; and to do this I do not employ the ordinary vernier-scale, in which the difference of the opposed divisions is equal to the smallest fraction that can be read, but I use the unit difference (one more or less) between the two opposed scales, while I form the divisions in the vernier about one-third, one-fourth, or other fractional part of those described on the complete circle. The bridge *a'* is shown provided with a similar differential scale, *c'*, and the adjustment of the press-ring can thus be recorded, as well as of the punch.

From the above description it will be seen that several advantages result from my constructing the press-ring with a tubular shank through which the punch-rod is operated. First, the press-ring can be adjusted by a single nut, instead of two or four, as in previous constructions; secondly, the press-ring can be more firmly and solidly secured to the cross-head than when connected by several screw-rods remote from the center; thirdly, the locking device I have invented can be more readily applied and operated; and, fourthly, the adjusted position of the press-ring upon the die can be noted by the means I have described, and renewed at any subsequent time, when the same tools are to be used. These advantages are very great in practice, as a great many trials and repeated danger to the blanks often result during the setting of the press-ring by the screw-rods usually employed. The cross-head and press-ring are often considerably separated in presses of other construction than that shown in the drawings; and my invention consists, partly, in the combination and arrangement of the shank *b* with a cross-head moving in slides in the manner set forth, whereby the movements of the cams are conveyed to the press-ring in the most direct and positive manner.

In Figs. 1, 5, and 6 the nut *s* is shown provided with right and left hand jam-nuts, *l*; but the same may be replaced, if desired, with locking-collars, like *m*, by forming fixed collars on the sections *r r'*, against which the pressure could abut.

In Fig. 7 is shown a separate collar, *m'*, for application to the upper side of the ring L, to avoid the forming of the spiral faces thereon. Such collars *m'*, and also the one at the other side of the collar *m*, require to be held fast to the shank *b* when the locking is effected, which may be done in either of the two ways shown herein. Thus at *m'* a pin, u^2, is shown projected from the lower side, adapted to fit into a hole in the top of the ring L.

At m^2 (the collar lying between the spiral collar and the sectional wings *e*) a key, *u'*, is shown in Fig. 8 fitted into a keyway in the shank *b*, and thus holding the same from turning when the locking is effected. Loose collars similarly operating could be applied to the nut *s* had collars been forged upon the rods *r r'*, and the entire adjusting mechanism thus be relieved of the working strain by turning collars, similar to $m^\times$, when the punch is properly adjusted. The use of these locking devices requires no time in practice and obviates much of the annoyance caused by the slipping of ordinary jam-nuts, besides preserving the screw-threads entirely from wear.

It is obvious that my invention is independent of the constructive features of the press to which it may be applied, and can be used in machines having a very different form of frame from that shown, and having the driving-shaft C arranged beneath the bed, as is common in large machines.

The cross-head may be mounted upon other kinds of guides than those shown, and may be modified in its appearance to any extent, provided it affords a central support to the press-ring by its shank *b*, and contains means for adjusting the same therein.

The punch-connecting rod may also be modified in appearance, provided the adjusting mechanism be applied between the crank and cam E and the punch *p*, and provided with the indicating and adjusting devices described. The latter may therefore be applied to the rod *d*, if preferred, and the same results be secured.

Having thus described my invention, what I claim as new is—

1. A screw-rod fitted to and moving in an

adjusting-nut, one end whereof is cylindrical, and has its whole periphery divided into a certain number of equal spaces, combined with a non-rotating cylindrical member in contact with said nut, bearing a peripheral scale differential as to the scale upon the nut, substantially as and for the purpose set forth.

2. A non-rotating screw-rod and rotating adjusting-nut, whereby said rod may be moved, combined with a differential vernier-scale, one part of which is inscribed upon said nut and the other part upon an adjacent non-rotating member, substantially as shown and described.

3. The combination, in an extension-rod for press-punches, of two sections, *r r'*, each provided with screw-threads fitted to the adjusting-nut *s*, the revolution whereof changes the length of said rod, and means for indicating the position of the nut upon the rod, whereby said change of length may be ascertained and determined, substantially as shown and described.

4. The combination, with a screw-rod in two parts, *r r'*, of an adjusting-nut, *s*, provided with a scale upon its periphery, and a collar, *s'*, fitted to slide but not turn upon said rod, and provided with a differential scale, substantially as shown and described, to form an index for use with the scale upon the nut.

5. The combination, in a double-acting press, of a cross-head moved independently of the punch, a press-ring centrally supported and adjusted in the cross-head, and a punch-rod operating through the center of the press-ring, substantially as herein shown and described.

6. The combination of the cross-head G, having a space formed between two transverse bridges, *a a'*, as described, with the tubular shank for the press-ring L, and the nut *c*, fitted to the shank and operated to adjust the same in the cross-head, substantially as described and shown.

7. The combination, with the cross-head G and the press-ring centrally sustained therein by shank *b*, of the locking device consisting of the spiral-faced collar and suitable abutting surfaces, substantially as herein shown and described.

8. The locking device for extension-rods or adjusting-nuts, consisting of the circular wedge *m*, operating against suitable abutment, and provided with the set-screw *o*, substantially as shown and described, whereby the screw-threads are relieved from strain.

9. The combination, with a nut and rod or equivalent adjusting device, of a fixed abutment upon the rod, the circular wedge *m*, and divided washers *e*, the whole constructed and operated substantially as shown and described.

10. The combination, with a cross-head, as G, of a centrally-supported press-ring, and adjusting-nut, as *c*, and an index or scale applied to said nut for indicating the position of the same, substantially as shown and described.

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Witnesses:
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