July 19, 1932. H. B. GREENWOOD 1,868,385

MEANS FOR ADJUSTING REGISTER OF MACHINE PARTS

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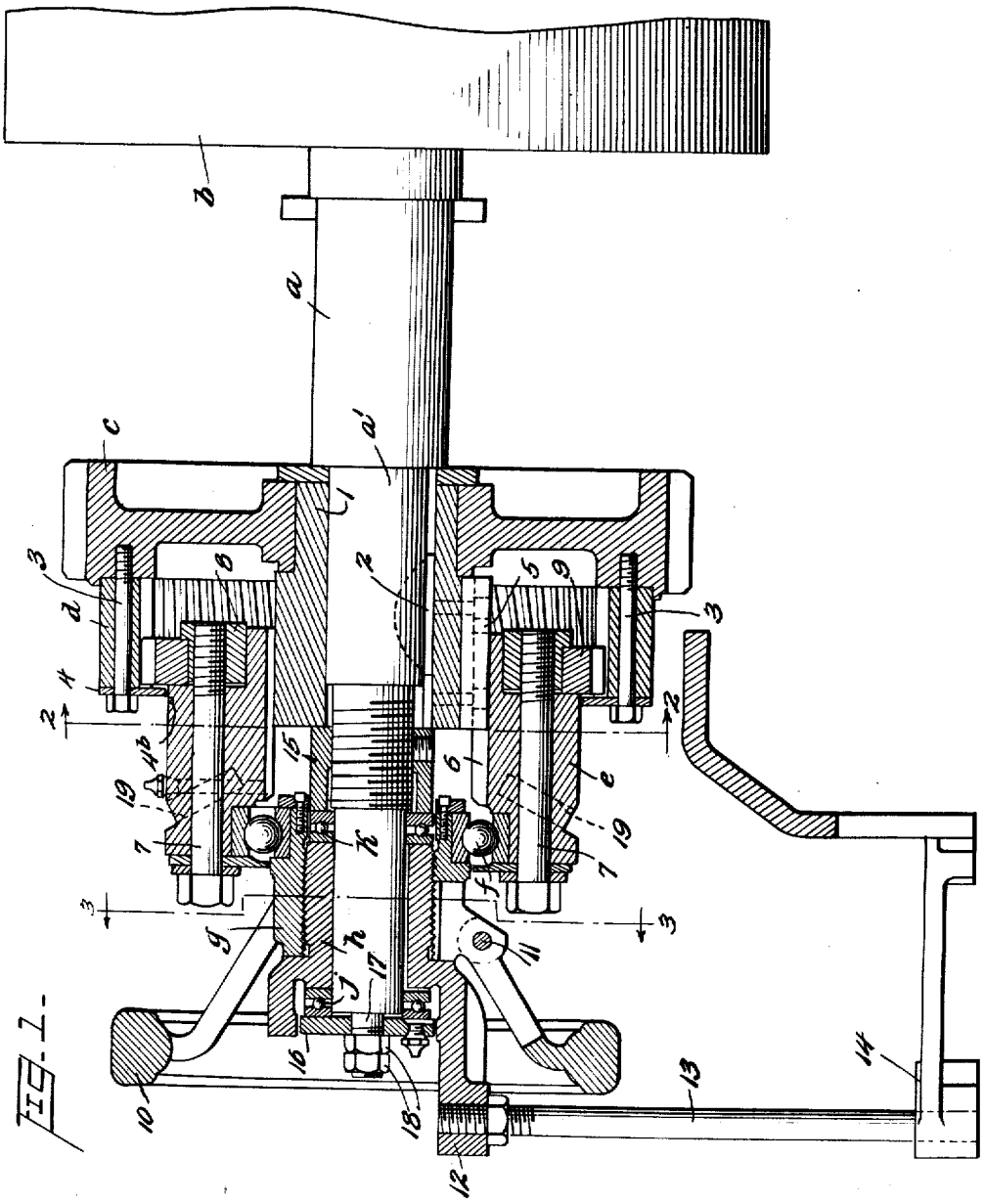


FIG. 1.

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FIG. 2.

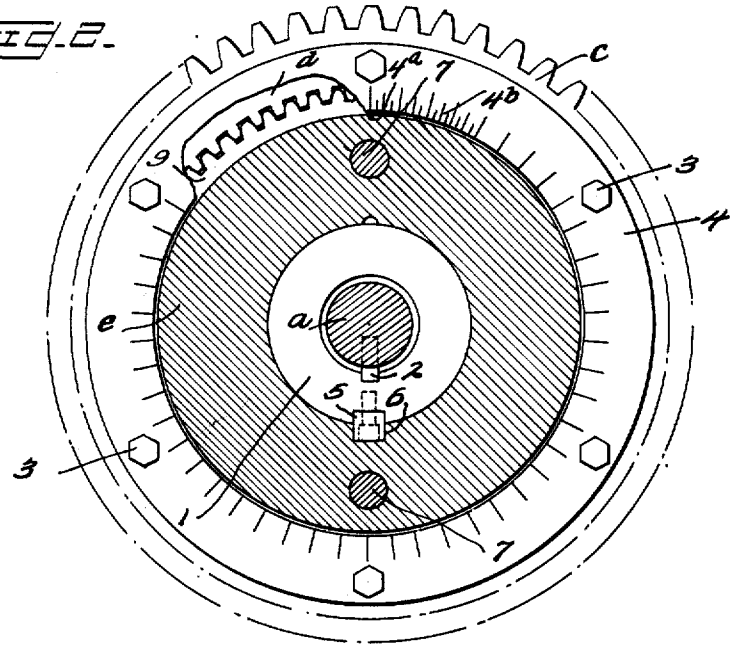
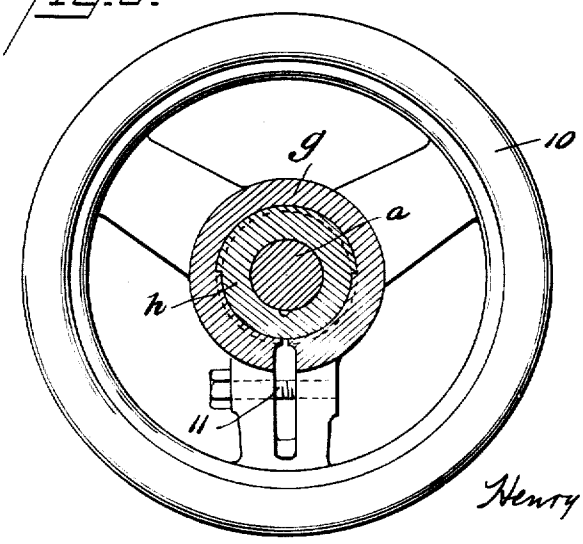


FIG. 3.



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Patented July 19, 1932 1,868,385

UNITED STATES PATENT OFFICE

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MEANS FOR ADJUSTING REGISTER OF MACHINE PARTS

Application filed August 14, 1931. Serial No. 557,190.

This invention relates to an attachment for machines having rotary elements which operate upon work passing through the machine, whereby each rotary element may be adjusted about its axis, while the machine is in motion, to make the element register with exactness on the work. Thus, in a machine for making and printing upon box blanks of corrugated board, the printing cylinders and the rotary slotting knives which operate upon the blanks are driven in unison by gear trains, and it is desirable to have ready means for adjusting the cylinders and the slotting heads about their axes while the machine is in motion, in order that the forms on the cylinders may be brought into exact registry on the work and in order that the knives on the slotting heads may be made to engage the blanks at exact points, to regulate the lengths of the slots in the blanks. The attachment permits of a wide range of adjustment while the machine is stopped, in order that the elements may be preliminarily set in approximate registry, while the finer adjustments may be made during the operation of the machine when any defects in the registry can be observed on the work.

In carrying out the invention, a driving gear, which is part of a gear train, is journaled upon the shaft which carries the rotary element requiring adjustment, and a sleeve which rotates with the shaft is slidable axially thereon. Two intermeshing spiral-toothed coupling members, concentric with the shaft and one within the other, are mounted upon the driving gear and sleeve, respectively, so that the power from the driving gear is transmitted through the coupling members and sleeve to the shaft. An adjustment of the sleeve lengthwise of the shaft will adjust the latter angularly with respect to the driving gear. Provision is made for adjusting the sleeve, through the medium of a hand wheel, while the machine is in motion, and provision is also made for releasing the spiral coupling member from the sleeve so that the sleeve and shaft may be turned through a wider range of adjustment when the machine is stopped. The invention also embodies certain features of construction which will be clear from the following specification and drawings.

In the accompanying drawings,

Fig. 1 is a central longitudinal section through the adjusting mechanism and driving gear, mounted upon the shaft of the printing cylinder;

Fig. 2 is a section on the line 2—2 of Fig. 1, and,

Fig. 3 is a section on the line 3—3 of Fig. 1.

In the drawings the invention is represented as applied to the shaft *a* of a printing cylinder *b* which is usually driven by a train of gears, one of which is mounted upon the shaft. In the present invention, the spur gear *c* is one of the train and is journaled upon a bushing 1 which is keyed to a reduced portion *a'* of the shaft and rotates with it, the key being shown at 2. An internally threaded spiral coupling member *d* is secured to one side of the spur gear *c* by bolts 3 which also pass through a vernier ring 4 and clamp the latter against the member *d*. A sleeve *e* surrounds the bushing 1 and is keyed to the later by a key 5 which fits into a groove 6 in the sleeve. Bolts 7 extend longitudinally through the sleeve and into a clamping ring 8 upon which an externally threaded spiral-toothed coupling member 9 is rotatively mounted. The teeth of the member 9 are in mesh with the teeth of the member *d*. Normally the member 9 is clamped tightly to the sleeve by the ring 8. With this arrangement, it will be seen that the driving force applied to the spur gear *c* will be transmitted to the shaft *a* through the two spiral-toothed members, the sleeve *e* and the bushing 1 which is keyed to said sleeve and to the shaft.

The sleeve *e* is slidable longitudinally of the shaft and it will be evident that if the member 9 be moved to the right, in Fig. 1, it will cause the shaft of the printing cylinder to be adjusted angularly with respect to the driving gear *c* which, being in a train of gears, will not be moved by such adjustment. A movement of the member 9 in the opposite direction will cause a corresponding adjustment of the cylinder shaft and cylinder.

The adjustable sleeve *e* projects some dis-

tance beyond the bushing 1, as shown in Fig. 1, and a radial and thrust ball bearing *f* is arranged between the sleeve and an adjusting nut *g* which is threaded onto a stationary sleeve *h* which surrounds the end portion of the shaft *a*. The nut *g* is provided with a hand wheel 10 by which it may be turned on the stationary sleeve and the nut is split at one end so that it may be clamped by a screw 11 to said sleeve to prevent rotation of the nut by the friction of the bearing *f*. The sleeve *h* has an extension 12 in which is fitted a vertically arranged torque bar 13, the lower end of which extends into a socket in a stationary bracket 14. The torque bar prevents rotation of the sleeve. For some purposes, it is desirable to adjust the printing cylinder vertically, to suit different thicknesses of material upon which it may be operating and for that reason the torque bar is slidable vertically in the socket of the bracket 14.

It will be evident from the foregoing description that if the hand wheel 10 is turned, the nut *g* will be moved longitudinally of the shaft and through the thrust and radial bearing *f*, the rotatable sleeve *e* and the spiral-toothed coupling member 9 which is clamped to it will move axially and the spiral teeth will also cause the sleeve *e*, bushing 1 and shaft *a* to be angularly adjusted with respect to the spur gear *c*. Thus the register of the printing cylinder can be changed while the machine is in motion.

As the driving force is applied to the cylinder shaft through spiral-toothed coupling members, the latter give an endwise thrust to nut *g* and hence to sleeve *h*. In order to prevent endwise movement of the nut and sleeve, thrust bearings, *j* and *k* are arranged at the ends of the stationary sleeve *h*. The bearing *k* is arranged between stop nut 15 on the shaft and the sleeve *h*, and the bearing *j* is arranged between said sleeve and a disk 16, which is slidably mounted on a stud 17 projecting axially from the end of the shaft. The disk is adjustable to take up end play and wear in the bearings *j* and *k*, by means of nuts 18. Wear and play in the bearing *j* can be taken up by adjusting the nuts 18 and further adjustment of these nuts will cause sleeve *h* to slide axially on shaft *a* and will likewise remove any play from bearing *k*. The nut 15 prevents endwise movement of the sleeve 1 on the shaft.

By turning the hand wheel, a limited adjustment of the shaft and printing cylinder may be made while the machine is in motion. To provide for a greater adjustment, as when initially setting the printing cylinder, the spiral-toothed coupling member 9 may be unclamped from the sleeve *e*, by loosening the clamping screw 7 and the sleeve may then be rotated independently of the gears. For this purpose, the sleeve is provided with several sockets 19 into which a wrench may be inserted to turn the sleeve about its axis. As the sleeve is keyed to the bushing 1 and the latter is keyed to the cylinder shaft, the shaft will rotate with the sleeve. After this larger adjustment is made, the bolts 7 will be tightened to clamp the member 9 to the sleeve, and the finer adjustments can then be made by turning the hand wheel while the machine is in motion.

The sleeve *e* has an index mark 4^b (Fig. 2) adjacent the ring 4 and the latter has a scale 4^a, by reference to which the degree of adjustment of the shaft and cylinder may be observed.

While I have described the invention as applied to a shaft of a printing cylinder, for the purpose of illustration, it will be evident that it may be applied to the shaft of any rotary element which requires adjustment angularly with respect to the driving gear on the shaft, and in machines where several such elements are geared together and operate in unison, an adjusting attachment will be applied to the shaft of each element.

What I claim is:

1. The combination with a shaft and a driving gear journaled thereon, of means for adjusting the shaft angularly with respect to said gear comprising a sleeve rotatable with the shaft and axially movable thereon, two intermeshing spiral-toothed coupling members concentric with the shaft and one within the other, one of said spiral members being secured to the driving gear and the other secured to said sleeve, and means for adjusting said sleeve axially of the shaft.

2. The combination with a shaft and a driving gear journaled thereon, of means for adjusting the shaft angularly with respect to said gear comprising a sleeve rotatable with the shaft and axially movable thereon, two intermeshing spiral-toothed coupling members concentric with the shaft and one within the other, one of said spiral members being secured to the driving gear and the other being journaled on the sleeve, means for clamping the latter member to the sleeve, and means for adjusting said sleeve axially of the shaft.

3. The combination with a shaft and a driving gear journaled thereon, of means for adjusting the shaft angularly with respect to said gear comprising a sleeve rotatable with the shaft and axially movable thereon, two intermeshing spiral-toothed coupling members concentric with the shaft and one within the other, one of said spiral members being secured to the driving gear and the other secured to said sleeve, and means for adjusting said sleeve axially of the shaft comprising a stationary sleeve surrounding the shaft, an adjusting nut threaded on to said sleeve and a thrust bearing between said stationary and rotatable sleeves.

4. The combination with a shaft and a driving gear journaled thereon, of means for

adjusting the shaft angularly with respect to said gear comprising a sleeve rotatable with the shaft and axially movable thereon, two intermeshing spiral-toothed coupling members concentric with the shaft and one within the other, one of said spiral members being secured to the driving gear and the other secured to said sleeve, means for adjusting said sleeve axially of the shaft comprising a stationary sleeve surrounding the shaft, an adjusting nut threaded on to said sleeve and a thrust bearing between said stationary and rotatable sleeves, stops on the shaft at the ends of the stationary sleeve, and thrust bearings between the last mentioned sleeve and the stops.

5. The combination with a shaft and a driving gear journaled thereon, of means for adjusting the shaft angularly with respect to said gear comprising a sleeve rotatable with the shaft and axially movable thereon, two intermeshing spiral-toothed coupling members concentric with the shaft and one within the other, one of said spiral members being secured to the driving gear and the other secured to said sleeve, means for adjusting said sleeve axially of the shaft comprising a stationary sleeve surrounding the shaft, an adjusting nut threaded on to said sleeve and a thrust bearing between said stationary and rotatable sleeves, stops on the shaft at the ends of the stationary sleeve, and thrust bearings between the last mentioned sleeve and the stops, and a vertically extending torque rod secured to the stationary sleeve and loosely engaging a stationary socket.

In testimony whereof, I affix my signature.

HENRY B. GREENWOOD.

DISCLAIMER

1,868,385.—*Henry B. Greenwood*, Glenarm, Md. MEANS FOR ADJUSTING REGISTER OF MACHINE PARTS. Patent dated July 19, 1932. Disclaimer filed May 7, 1934, by the patentee.

Hereby enters this disclaimer to claim 1 of said Letters Patent, to wit:

"1. The combination with a shaft and a driving gear journaled thereon, of means for adjusting the shaft angularly with respect to said gear comprising a sleeve rotatable with the shaft and axially movable thereon, two intermeshing, spiral-toothed coupling members concentric with the shaft and one within the other, one of said spiral members being secured to the driving gear and the other secured to said sleeve and means for adjusting said sleeve axially of the shaft.

[*Official Gazette May 29, 1934.*]

adjusting the shaft angularly with respect to said gear comprising a sleeve rotatable with the shaft and axially movable thereon, two intermeshing spiral-toothed coupling members concentric with the shaft and one within the other, one of said spiral members being secured to the driving gear and the other secured to said sleeve, means for adjusting said sleeve axially of the shaft comprising a stationary sleeve surrounding the shaft, an adjusting nut threaded on to said sleeve and a thrust bearing between said stationary and rotatable sleeves, stops on the shaft at the ends of the stationary sleeve, and thrust bearings between the last mentioned sleeve and the stops.

5. The combination with a shaft and a driving gear journaled thereon, of means for adjusting the shaft angularly with respect to said gear comprising a sleeve rotatable with the shaft and axially movable thereon, two intermeshing spiral-toothed coupling members concentric with the shaft and one within the other, one of said spiral members being secured to the driving gear and the other secured to said sleeve, means for adjusting said sleeve axially of the shaft comprising a stationary sleeve surrounding the shaft, an adjusting nut threaded on to said sleeve and a thrust bearing between said stationary and rotatable sleeves, stops on the shaft at the ends of the stationary sleeve, and thrust bearings between the last mentioned sleeve and the stops, and a vertically extending torque rod secured to the stationary sleeve and loosely engaging a stationary socket.

In testimony whereof, I affix my signature.

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