

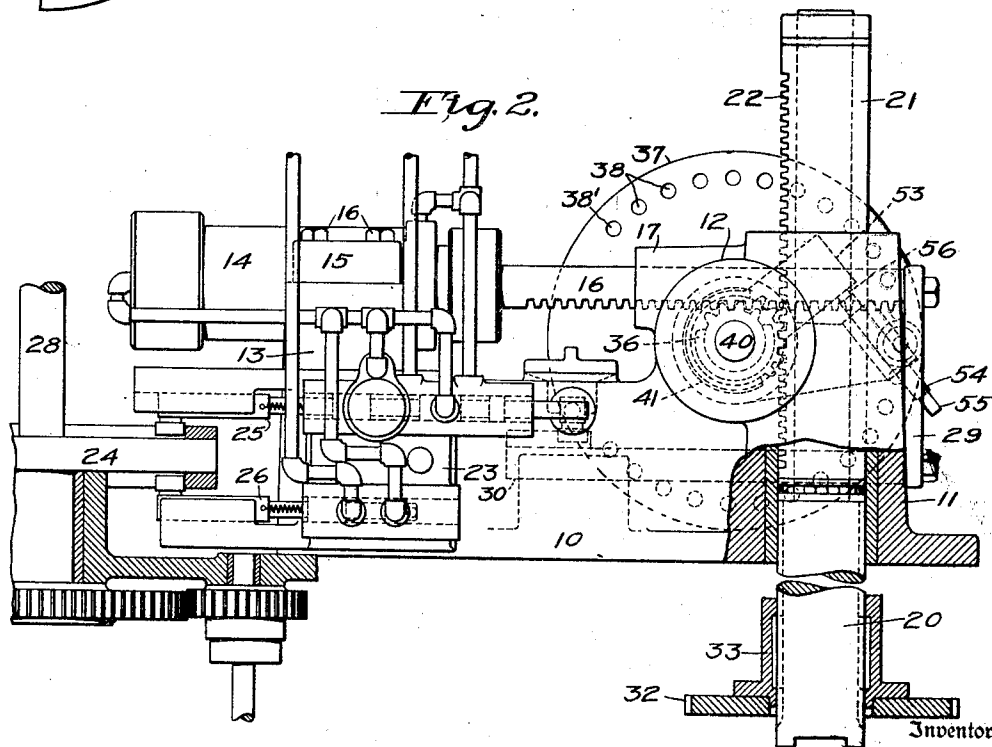
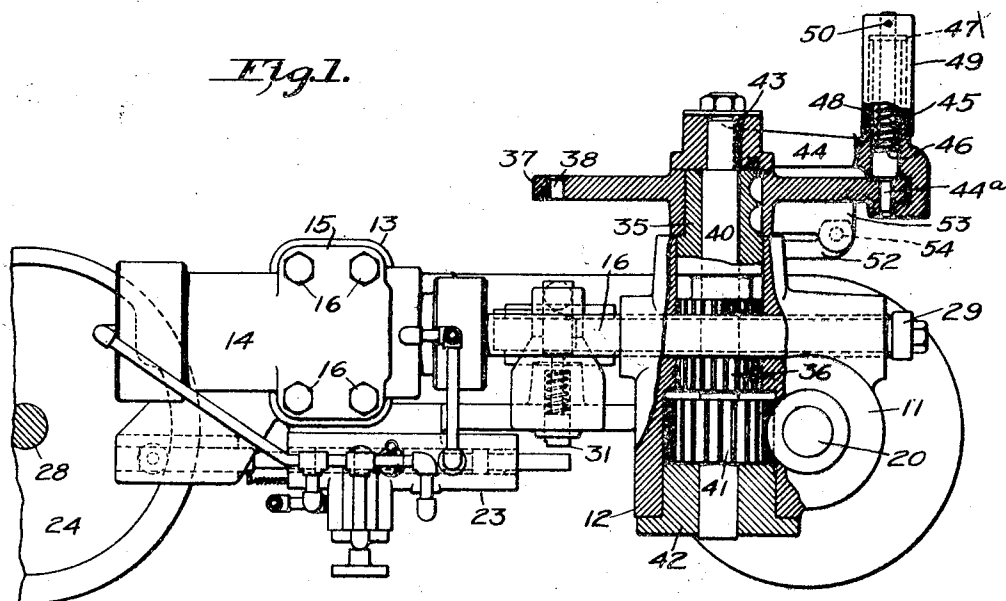
Sept. 8, 1931.

A. L. DE LEEUW

1,822,692

ADJUSTABLE DRIVE FOR SPINDLE FEEDS

Original Filed Dec. 7, 1926



31

Adolph L. De Leeuw

Nathan & Bowman

Attorneys

UNITED STATES PATENT OFFICE

ADOLPH L. DE LEEUW, OF PLAINFIELD, NEW JERSEY

ADJUSTABLE DRIVE FOR SPINDLE FEEDS

Original application filed December 7, 1926, Serial No. 153,177. Divided and this application filed May 11, 1928. Serial No. 276,847.

The present invention is a division of application Serial No. 153,177 filed Dec. 7, 1926 and relates to an adjustable drive for translating certain members such as the drill spindles in the machine disclosed in the above application, and to limiting stop means in connection therewith.

More particularly, the invention includes a reciprocating element with an adjustable connection for translating the spindle, the element being reciprocated through a given range determined by the fluid pressure cylinder of the power actuating means.

A work or tool-spindle of the translatable type must, to meet working conditions, have a very substantial range of movement in order to perform its work operations and also to permit retraction thereof to an extent whereby the work and tool are completely disengaged.

If working conditions were always the same it would be a relatively simple matter to so construct the actuating means as to move the tool the required previously determined distance. It is apparent, however, that this condition may vary as, for example, the distance between the tool carrying spindle and the work-table is usually made adjustable; also the height of the work and the length of the supported cutting tool may be different for different jobs.

It may be apparent that the shorter the movement of the actuating means the greater will be the economy of space, materials, and operating parts, the limit being reached when the range of movement of the actuating means corresponds exactly to the necessary range of movement of the spindle, with the spindle so positioned as to require the minimum amount of translation.

The invention disclosed herein affords a compact and easily and quickly manipulated means for varying the relation between the actuating means and the translatable member without varying the range of movement of this member.

Another of the primary features of this invention resides in the limit stop means. Stop means in machine tools in connection with a fluid operated member are of course in

general of a quite common use. That is, a very accurate termination of the cutting stroke has been accomplished by providing a fixed mechanical stop which is directly engaged by the fluid actuated element, the fluid actuating means being impositive to the extent of overcoming the fixed stop but sufficiently positive for the conditions of the cutting stroke.

The present stop means, however, are peculiarly adapted to co-operate with the adjustable means forming a main feature of the invention. One important phase in this regard being that the adjusting means determines the approximate limits of the stroke whereas the specific stop means constitutes a finer adjustment for determining the extreme limit of the working stroke, the two-in combination providing a very accurate limit stop means but one capable of adjustment over a relatively large range.

As will be seen from the hereinafter detailed description, each of these adjustments may be made in a very quick and easy manner. The means for adjusting the relation between the actuating device and the spindle is especially arranged for convenience, and adjustment thereof is easily accomplished without the necessity of resorting to the loosening of clamp bolts and nuts or such similar devices.

Other objects and advantages will be in part indicated in the following description and in part rendered apparent therefrom in connection with the annexed drawings.

To enable others skilled in the art so fully to apprehend the underlying features hereof that they may embody the same in the various ways contemplated by this invention, drawings depicting a preferred typical construction have been annexed as a part of this disclosure and, in such drawings, like characters of reference denote corresponding parts throughout all the views, of which:—

Figure 1 is a plan view of a portion of the machine tool incorporating the present invention and Fig. 2 is an elevational view thereof.

The invention has many applications, one

particular advantageous use thereof being in connection with a continuous rotary type of machine such as is shown in the above referred to prior application. In such a type machine, for example, the spindle carrying head and the work-table are fixed relative to each other. It may be seen therefore that with the variety of work which may be machined the range through which the tool carrying spindle is required to be translated may vary as to its limits by large amounts depending upon the height of the work, its position on the work-table and the particular operation to be performed thereon.

The general features of the construction shown in the drawings exemplifying this invention includes a base or supporting frame 10 provided with an up-standing bracket 11 carrying the journal 12 within which are rotatively mounted the various elements to be later described. At the opposite end of base 10 a second up-standing bracket 13 carries thereon the cylinder 14 by means of the projecting lugs 15 integral with the cylinder. A series of screw bolts 16 serve to secure the cylinder in position thereon.

The cylinder 14 has therein a fluid pressure operated piston to which is secured the rack bar 16 slidable in guide 17 integral with the journal housing 12. Mounted for vertical movement in the bracket 11 is the spindle 20. The spindle is provided with a non-rotatable sleeve 21 having rack teeth 22 thereon.

Indicated generally at 23 is a dual valve system which serves to control the flow of fluid to the cylinder 14 in a cyclic manner. These valves are in turn governed by the cam 24 engaging with rollers on the valve stems 25 and 26. The particular valve means illustrated herein are adapted to govern the rack bar 16 and thereby the spindle 20 according to a specific cycle of fast and slow movements and in forward and reverse directions. It is to be understood, however, that any type of valve may be used such as a simple slide valve actuated in any desired manner in accordance with the particular machine upon which the device is employed and the details of the present valve means will not be described since the present invention is directed to the means of connecting rack bar 16 with the spindle 20 and also stop means for limiting the downward movement of the spindle 20. The particular control herein is that employed in the continuous rotary machine disclosed in the above referred to application and in so far as the present application is concerned it may be said that the frame 10 shown herein and the structure supported thereon revolve around a central axis with which shaft 28 is concentric the cam 24 being fixed or stationary whereby the valve means are controlled as the unit revolves around the central axis of the major frame structure. The rack bar 16 also car-

ries at its outer end a plate 29 to which is rigidly secured cam bar 30 adapted to trip the interference member 31 in accordance with the specific cycle for which the present unit is adapted. A suitable drive for rotating the spindle 20 may be accomplished through the gear 32 secured to the sleeve 33 in which is splined spindle 20.

Referring now again to the drive connection between the rack bar 16 and the spindle 20 a member 35 is rotatively mounted within the journal 12, such member having integral therewith the gear 36 engaged by the rack bar 16. Fastened on the outer end of the rotatable member 35 is the index plate 37 having therein a series of holes 38.

Centrally mounted within the sleeve or shaft 35 is the shaft 40 which has rigid therewith the gear 41 meshing with the rack teeth on the spindle sleeve 21. A suitable bushing 42 is provided for the inner end of the shaft 40. The outer end of the shaft 40 has secured thereon by means of the key 43 a manually adjustable lever 44 having at its outer end a plunger mechanism for permitting it to be adjusted with relation to the index plate 37. Such means comprise a plunger 44a adapted to be inserted in any one of the holes 38. The plunger is normally urged into engagement with such holes by means of the compression spring 45 adapted at one end to bear against shoulder 46 on the plunger and at the other end against a washer 47 rigidly connected to the cylindrical member 48 integral with the lever 44.

The plunger 44a may be normally withdrawn from the hole 38 for adjustment of the lever 44 relative to the index plate by means of the sleeve 49 adapted to slide over the sleeve 48. The plunger 44a is secured to the sleeve 49 by means of the pin 50.

Projecting from the main bracket 11 is a stop bracket 52. Rigid with the index plate 37 is a projecting lug 53 adapted upon rotation of the plate 37 to engage with stop 52 to thereby limit the stroke of the piston and likewise the downward movement of the tool spindle. Screw threaded through the stop 52 is the set screw 54 having the square end 55 for adjustment of the screw whereby the end 56 may be accurately positioned to limit the rotation of the disk 37. Such means provides a finer adjustment to take care of the distance between holes 38 of the plate.

By the means described it may be perceived that the rotation of the handle 44 relative to the plate 37 will move the spindle 20 without changing the position of the piston in the cylinder or in any way changing the length of the stroke thereof nor the range of movement of the spindle 20.

Movement of the handle 44 to any one of the various holes 38 merely changes the relative position of the spindle 20 at either end of its stroke but does not change the range

of the movement. Hence if the handle 44 were moved around to engage with the hole 38', the height of the spindle in its retracted position would be greater than for the adjustment shown in the drawings but the range of movement of the spindle would be unchanged.

The screw stop means 54 provides a very accurate and positive means for limiting the downward movement of the spindle and cooperates with the described adjusting means to result in a very compact and rigid construction. Each of the adjustments are readily accessible and may be quickly manipulated.

The operative portion of the movement of the spindle 20 may be positioned wherever desired for the most convenient operation and a very substantial range of movement retained thereafter without unduly increasing the size of the operative parts such as the length of the cylinder 14.

Without further analysis, the foregoing will so fully reveal the gist of this invention that others can, by applying current knowledge, readily adapt it for various utilizations by retaining one or more of the features that, from the standpoint of the prior art, fairly constitute essential characteristics of either the generic or specific aspects of this invention and, therefore, such adaptations should be, and are intended to be, comprehended within the meaning and range of equivalency of the following claims.

Having thus revealed this invention, I claim as new and desire to secure the following combinations and elements, or equivalents thereof, by Letters Patent of the United States:

1. A machine tool combining a support; a translatable member carried thereby; a rotary member having a drive connection to translate said translatable member; a second rotary member concentrically mounted with said first rotary member; a rack; power means for reciprocating said rack; means for oscillating said second member by the reciprocations of said rack; means for connecting said first rotary member to said second member in selective predetermined angular positions to rotate therewith to thereby vary the limits of the translatable movement of said translatable member without varying the range of said movement; and adjustable stop means adapted to form a finer adjustment than said adjustable connection for determining the limit of translatable movement in one direction.

2. A machine tool combining a support; a translatable spindle mounted thereon; a first rotary member; a first gear carried thereby; a rack meshing therewith; power means for reciprocating said rack; a second rotary member mounted concentrically with said first member; a second gear carried

thereby; a rack carried by said spindle meshing with said second gear; means for selectively connecting said second rotary member to said first member in a plurality of predetermined angular positions relative thereto and to rotate therewith, whereby the limit of translation of said spindle in one direction may be varied without varying the range of translation; and stop means engageable by said first rotary member to positively determine the limit of translation in said direction, said stop means being adjustable to provide a finer adjustment to compensate for the distance between said predetermined angular adjustments.

3. A machine tool combining a support; a translatable member carried thereby; a sleeve rotatably journaled in said support; a shaft journaled in said sleeve and adapted to be secured thereto in various angular positions; a gear connection between said shaft and said translatable member for translating the latter by rotation of the former; a disk secured to said sleeve and provided with a plurality of angularly spaced apertures; an arm secured to said shaft; a spring pressed plunger carried by said arm and adapted by angular adjustment of said arm, selectively to be engaged with any one of said apertures thereby to secure said shaft and sleeve together in said various angular positions, the adjustment of said shaft serving to vary the axial position of said member relative to said support; a reciprocating hydraulic motor; and an operative connection between said hydraulic motor and said sleeve for rotating the sleeve and shaft and thereby translating said member by reciprocations of said motor.

In witness whereof, I hereunto subscribe my name.

ADOLPH L. DE LEEUW.