Feb. 26, 1929. 1,703,218

J. WEGNER

ADJUSTMENT AND COMPENSATING DEVICE

Filed July 22, 1927 3 Sheets-Sheet 1

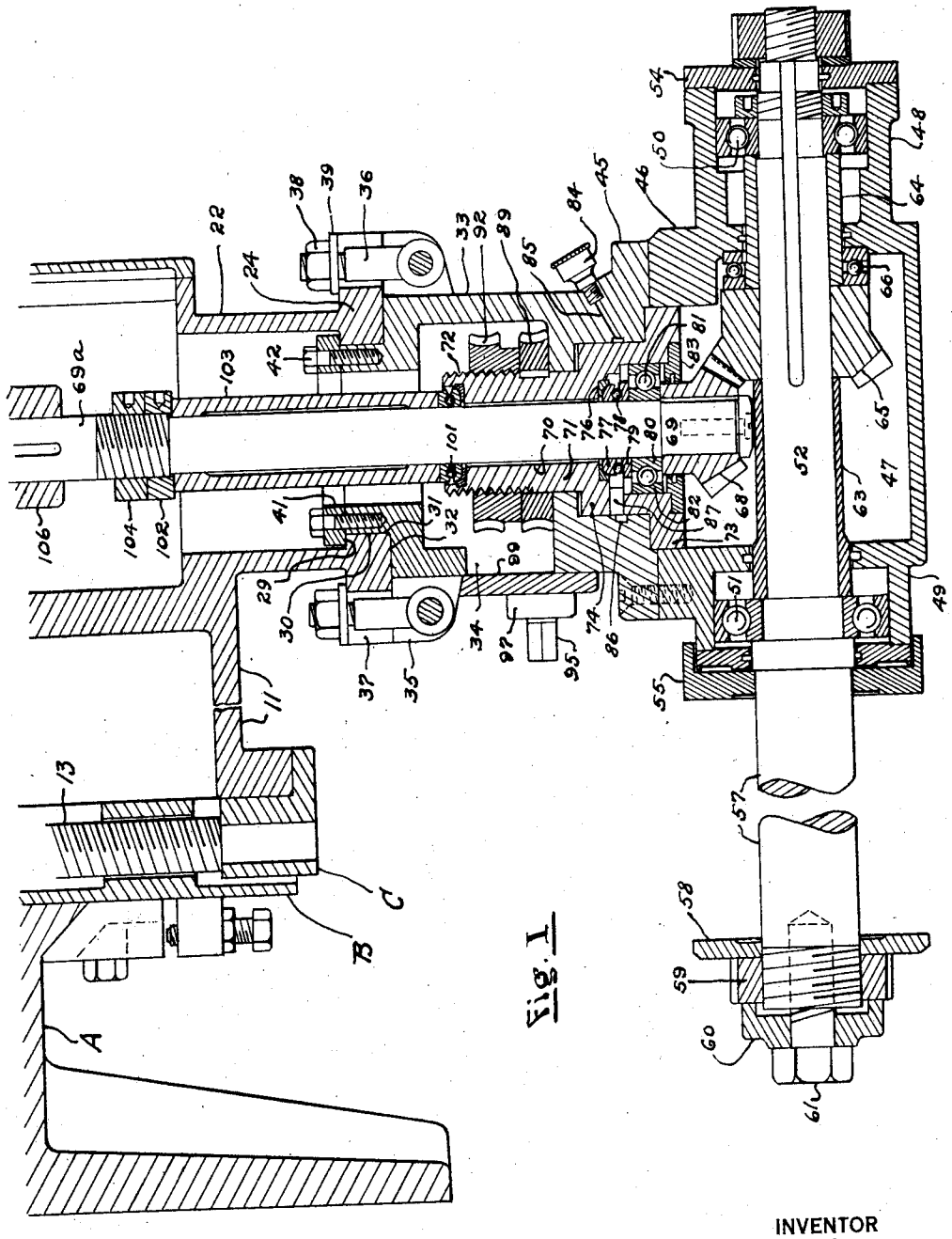


Fig. 1

INVENTOR
Julius Wegner
BY H C Charlson
ATTORNEY

Feb. 26, 1929. 1,703,218

J. WEGNER

ADJUSTMENT AND COMPENSATING DEVICE

Filed July 22, 1927 3 Sheets-Sheet 2

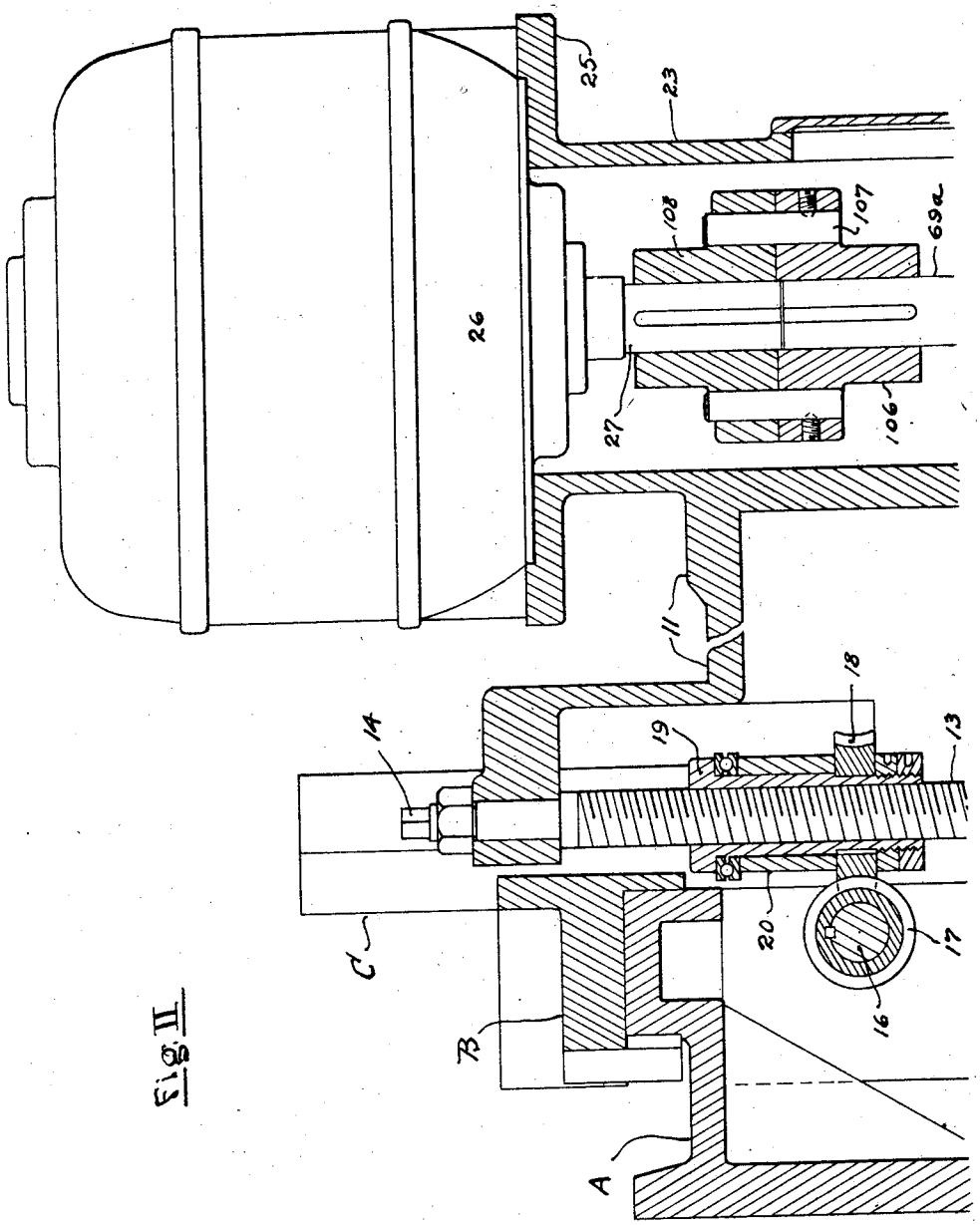


Fig. II

INVENTOR
Julius Wegner
BY H C Marlson,
ATTORNEY

Feb. 26, 1929. 1,703,218

J. WEGNER

ADJUSTMENT AND COMPENSATING DEVICE

Filed July 22, 1927 3 Sheets-Sheet 3

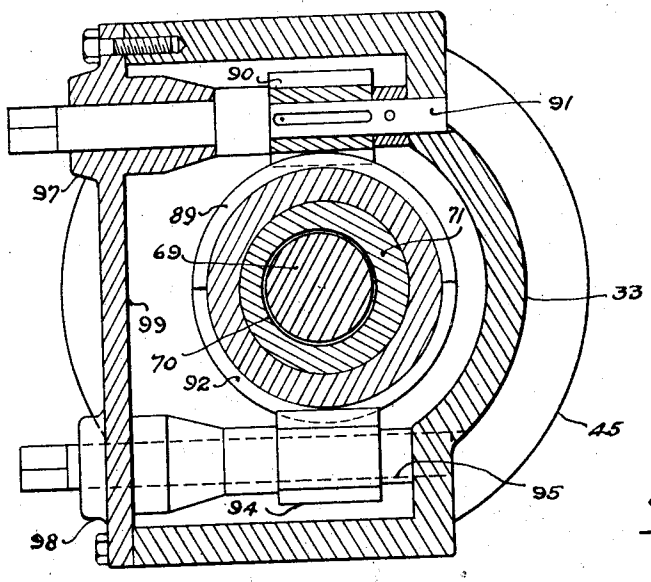


Fig. IV

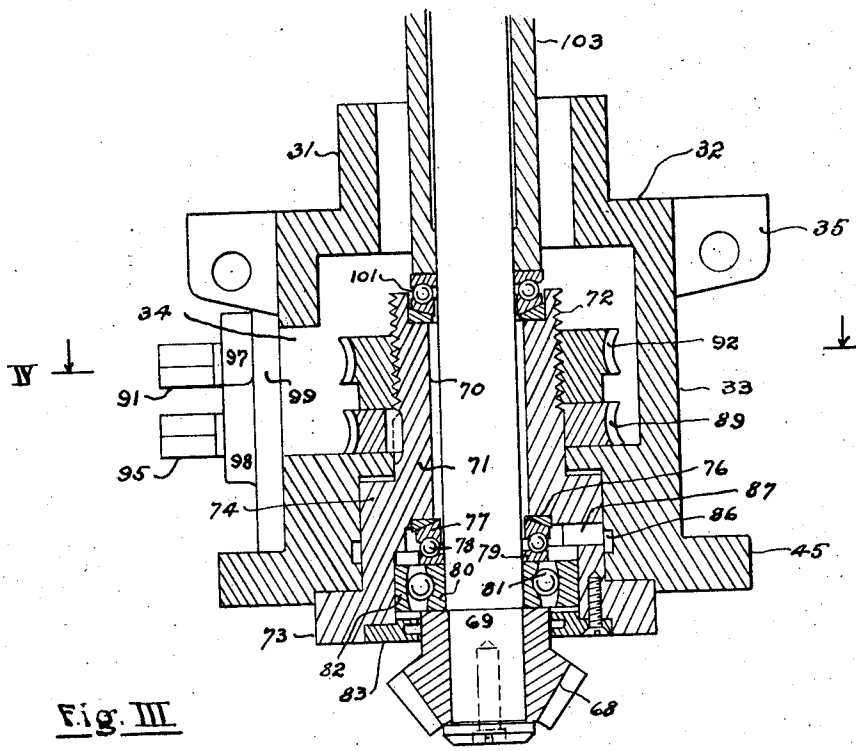


Fig. III

INVENTOR
Julius Wegner
BY H C Marlson
ATTORNEY

Patented Feb. 26, 1929. 1,703,218

UNITED STATES PATENT OFFICE.

JULIUS WEGNER, OF NEW YORK, N. Y.

ADJUSTMENT AND COMPENSATING DEVICE.

Application filed July 22, 1927. Serial No. 207,707.

The present invention relates to machine tools and particularly to the species thereof employed in the stone working industry.

Primarily the invention has for its object to produce an improved means for adjusting the rolling contact between the teeth of intermeshing gears.

A secondary object is to construct a take up device for the purpose set forth especially applicable to geared spindles disposed in angular relation one to another.

Thirdly, the invention contemplates making a device of the nature referred to, permitting the proper adjustment and bringing together of the teeth of inter-engaging bevel gears when worn in order to eliminate noise and lost motion or back lash therebetween.

Fourthly, the invention aims to provide a device of the kind mentioned, admitting of one end of a power driven spindle to be slightly deflected without affecting its operation.

A fifth object is to supply a device of the type aforesaid, composed of a minimum number of parts, combining to make up a rigid, but light while amply strong structure; readily assembled and adjusted; besides being of a character not likely to become disarranged.

Other objects and advantages of the invention will be obvious and more fully brought out in the detailed description hereinafter contained.

Generally stated, the invention consists of the novel improvements, parts, combinations, and features of construction herein shown and described, and particularly pointed out in the appended claims.

A practical embodiment of the invention is illustrated in the three sheets of drawings hereto annexed, which form an integral part of this specification, and wherein similar characters of reference are employed to designate corresponding elements wherever they occur in the several views.

Referring to the said drawings:—

Figure I is a sectional elevation of the lower portion of the part of the machine wherewith this take-up device cooperates;

Fig. II is a view similar to the preceding and illustrating the upper portion of the same part of the machine;

Fig. III is also a sectional elevation showing on an enlarged scale, the device referred to, in conjunction with some of the coacting adjacent elements, and rearwardly located parts omitted; and

Fig. IV is a horizontal section taken irregularly on the line IV—IV of Fig. III, looking down thereon in the direction of the thereto appertaining arrows.

Succinctly outlined, the invention forming the subject matter hereof, comprises a housing having rotatably mounted therein a sleeve which is provided with an eccentrically disposed bore. Within this bore is journalled a driving shaft carrying near one end thereof a cog-wheel that may be of the bevel gear type. The teeth of the latter mesh with those of another gear affixed to a spindle that if desired, can be arranged in right angular relation to and driven by the aforementioned shaft. The driven spindle is revolvably carried in an extension of the before named housing and is adapted to turn a circular tool of a kind suitable to perform the work required. Means are furnished for suitably adjusting the above referred to sleeve and the therewithin contained shaft in order to regulate the meshing engagement of the gears in question and thereby take up recurring wear between the teeth thereof. Other means are supplied for the purpose of locking the shaft containing sleeve in its position after adjustment.

While the accompanying drawings illustrate the preferred and what is now considered to be the best form of the invention, it will be observed that the same is shown and described herein by way of example only and that other serviceable embodiments of this improved device are within the range of practical achievement, whether containing the totality or a less number of the novel features of construction herein disclosed.

Before commencing the detailed description of the invention, it will be stated, in order to convey a clearer idea of the scope thereof, that such parts of the improved device as are indicated by letters of the alphabet thruout the present specification and accompanying drawings, appertain strictly speaking, to a known species of machine tools. On the other hand, the other parts of the device, which are designated by numerals, may be considered as entirely belonging to the invention. It is understood that no claim is made to any of the known parts

aforesaid as possessed of actual originality, save that thru their association with the various elements of the improved device they form a number of combinations serving to accomplish several new and useful purposes.

Having now particular reference to Figs. I and II of the annexed drawings, the letter "A" denotes a box or channel-shaped beam or cross-rail designed to be shifted vertically on one or more uprights (not shown) pertaining to the main frame of the machine. Along the horizontal guiding surfaces of this beam is translatable in any approved manner, a carriage B, in and across which is mounted a slide C, capable of movement in the same direction as that of the beam A, but independently thereof. To the slide C is affixed or formed integral therewith, a bracket-like support 11, which projects forward and outwardly from said slide. The instrumentality for effecting vertical travel of the slide C and the therewith connected support 11, may consist as shown, of a screw 13 that can be either manually operated by a wrench applied to its shank portion 14, or by power at option. The latter is conveniently transmitted from a shaft 16 suitably sustained by the beam A, thru interengaging worm and worm-wheel, 17 and 18, respectively, to a sleeve 19 having threaded engagement with the screw 13. Said sleeve 19 is rotatable in, but prevented from endwise movement within a hub 20 held stationary relatively to the carriage B. From the foregoing it will be seen that as the shaft 16 is revolved one way or the other, the slide C together with the support 11 is raised or lowered with respect to the said carriage, which as before stated, has a translatory motion longitudinally of the cross-rail A.

It will be perceived, that the outer or forward part of the support 11 is made hollow or columnlike as designated at 22, 23. At the opposite extremities of these columnar portions are provided flanges 24 and 25 respectively, of which the one last named, constitutes an entablature whereon is secured an electric motor 26, having its drive shaft 27 depend vertically into the space formed interiorly of the said portions 22, 23, preferably concentric therewith. The lower flange 24 is offset inwardly of the thereto appertaining hollow portion 22, affording adjacent thereto an annularly disposed ledge and throat 29 and 30 respectively.

Associated with this throat and the underface of the said flange 24, is the neck and shoulder 31 and 32 respectively, forming the top part of a chambered housing 33 having an opening 34 in one wall thereof. From the sides of the latter extend out ears 35 between which are hinged bolts 36 adapted to enter slots or notches 37 provided therefor in the edges of the flange 24. When nuts 38 on the aforesaid bolts are tightened down upon washers 39 overlying said slots 37, the housing 33 is firmly clamped in its assigned position against the underside of the said lower flange 24. It will be understood that the latter if desired, can be furnished with several such slots, spaced about the circumference thereof according to certain defined locations, in order to enable the housing being held in predetermined angular positions relatively to the primary support 11. For the purpose of retaining the housing 33 in place while the bolts 36 are swung out of the slots 37, an annulus 41 in the nature of a flange-like ring, is fastened to the upper face of the neck 31 by means of screws 42. The outer, free edge of the annular retaining ring 41 takes over and has its bearing upon the ledge 29. In view of the foregoing it will be clear that when the bolts 36 are disengaged from their slots 37, the housing 33 can be freely rotated without danger of becoming disassociated relatively to the support 11 thereabove.

The lower extremity of the aforesaid housing is provided with a flange-shaped appendage 45 to the underside whereof is fastened in any appropriate manner, the upper face of a casing 46 having a cavity 47 therewithin. The last mentioned casing has formed with it, oppositely extending hollow hub-like portions 48, 49 within which is journalled on anti-friction bearings 50, 51, respectively, a spindle 52. The outer ends of the bearing hubs 48, 49 are closed by caps 54, 55 respectively, serving to keep dust and grit from reaching the interior of the cavity 47. The spindle 52 has a free overhanging portion 57 that projects beyond the casing 46, as represented at the lower left-hand side of Fig. I, which portion is adapted to sustain thereon a suitable tool, such as an abrasive wheel (not shown). The means for retaining this tool in place on the spindle includes as shown, a washer 58, a nut 59 threaded thereagainst on said portion 57, a collar 60 bearing upon the side of this nut and urged thereto by a cap-bolt 61 screwed axially into the end of the said spindle portion.

Upon the part of the spindle 52 situated between the before mentioned anti-friction bearings 50, 51, there is mounted intermediate of tubular spaces 63, 64, a toothed wheel 65 which may be of the bevel-gear type. The endwise thrust produced by the latter is resisted by another anti-friction bearing 66 positioned interadjacent the hub of said gear 65 and the proximate inner wall of the casing's hub 48.

In mesh with the teeth of the gear 65 are those of a similar cog-wheel 68 secured as by keying, to the lower terminal of a shaft 69. The latter passes through and is guided within a clearance bore 70 of a sleeve-like element 71 which is revolubly adjustable in

the lower portion of the housing 33. The rotative centre of the sleeve 71 in question, is offset slightly, a few thousandths of an inch, from the true, aligned axes of the said housing and the shaft 27 pertaining to the motor 26. By virtue of the last named shaft coinciding with the before mentioned lower shaft 69, it stands to reason that the latter also will be eccentrically disposed with respect to the axis of the said element 71, the purpose whereof will be more fully hereinafter referred to. As will be perceived from an inspection of Figs. I and III, the sleeve 71 is composed of three, integrally formed body portions separated by intervening shoulders disposed in right angular relation thereto. Thus this sleeve comprises a shank (71) the upper and major part whereof is provided with screw-threads 72; a flange 73 at the opposite or lower end of the sleeve; and an intermediary portion 74 between the aforesaid shank and flange. By preference, the upper part of the flange 73, the lower part of the shank (71) and the entire middle portion 74, are jointly afforded a bearing within recesses of corresponding shapes and dimensions formed in the lower half of the housing 33 beneath the chamber therein.

Interiorly, the said sleeve-element 71 is also provided with different size recesses extending inwardly upward in stepped formation from the bottom face of the flange 73. In the smaller and upper one of the recesses last referred to, is lodged a washer 76 wherewith coacts another washer 77, constituting the top member or race of a vertically arranged thrust, ball-bearing 78, thru which the shaft 69 passes freely. The contacting surfaces of the washers 76 and 77 may advantageously be made concavo-convex, in order to enable them to more readily find their proper alignment irrespective of the gyratory motion partaken of by the shaft 69. The lower or companion member 79 of the aforenamed thrust bearing, is superimposed upon the inner race member 80 of another but horizontally disposed ball-bearing 81, which latter race is affixed to the shaft 68 in apposition to the hub of the gear 68 therebelow. The outer or peripheral race 82 pertaining to the horizontal laterally guiding ball-bearing 81, is non-rotatably carried from the inner walls of the second and central recess, while the lower and larger but shallower recess in the sleeve 71, is occupied by a disc-like guard 83 held in place by a screw or other convenient instrumentality. Lubrication for the hereinbefore referred to thrust and guide bearings, is supplied thru the agency of a cup 84 (Fig. I) which delivers oil or grease, by way of a passage 85 to an annular groove 86 which as illustrated follows the inside contour of one of the internal recesses in the sleeve element, there being a radial channel 87 that conveys the lubricant from said groove 86 to the interior of the recess mentioned.

To the shank portion of the sleeve 71 is keyed a worm-wheel 89 which is in juxtaposition with respect to the bottom surface of the chamber within the housing 33. In engagement with this worm-wheel is a worm 90 that is affixed to a spindle 91. The wheel and worm above referred to, comprises the means for rotatably adjusting the said element 71 and the thereby sustained shaft 69 and gear 68. In superposed relation to the first mentioned worm-wheel is another similar gear, designated in Figs. I and III by the reference numeral 92, which latter wheel is internally threaded to engage the exterior threads 72 on the shank (71). A worm 94 which coacts with the teeth of the last named gear 92 is fixedly mounted on a spindle 95 corresponding to the spindle 91 previously described. The purpose of the set of worm and gear latest referred to, is to draw the flange 73 into the conformably shaped recess in the appendage 45 pertaining to the housing 33, thereby firmly clamping the sleeve element 71 in its assigned position subsequent to the adjustment thereof having been effected. Both of the worm actuating spindles 91 and 95, find their bearings at one end in the side wall of the housing 33, and at the other, in bosses 97, 98, respectively, forming part of a cover plate 99, secured to the housing's opposite wall and employed to close the opening 34 leading into its chamber.

In the upper extremity of the shank portion of the aforesaid sleeve element, there is provided a recess or cavity wherein is received another thrust bearing 101 conforming to the lower situated bearing 78, and capable as well as the latter, of being self-aligning. Intermediate the top race or member of the said bearing 97 and nut 102 threaded onto the enlarged upwardly extending portion 69^a of the shaft 69, there is interposed a tubular spacer 103. A jamb-nut 104 also engaging said shaft portion 69^a and tightened upon the first mentioned nut 102, serves to lock the same from working loose.

To the uppermost end of the said shaft portion 69^a is keyed or otherwise held, a coupling member 106. This member has rigidly fastened adjacent the periphery thereof, one or more pins 107 that enter clearance openings therefor in a companion member 108, constituting the other part of the coupling which is affixed as by keying, to the lower end of the motor shaft 27. By virtue of the construction and arrangement described, the aforementioned coupling members afford a certain latitude in the axial alignment between shafts 27 and

69. While the limited flexibility of the coupled ends of these shafts is inappreciable as far as it concerns regularity of motion transmitted from the power source 26, still it permits the lower extremity of the shaft 69 being given a diminutive arcuate movement thru the rotative adjustment of the sleeve element 71.

From what has been stated hereinbefore, it will be comprehended that when wear between the intermeshing gears 65, 68, has worn their teeth so as to cause lost motion to make the working thereof noisy, irregular or otherwise objectionable, the simple expedient of crowding one of these gears against the other, will move their teeth into closer meshing engagement, thus taking up back-lash occurring therebetween. Turning of the spindle 95 in one direction by a suitable key or wrench applied to the outer end thereof, releases the clamping pressure which the worm-gear 92 exerts upon the worm-gear 89 affixed to the shank or upper portion (71) of the sleeve element. Similarly, by rotating the other spindle 91, the last mentioned worm-gear 89 actuating the sleeve element 71, revolves the same within the recessed seats in the housing 33. And, by reason of the fact that the axis of rotation of this sleeve is offset from that of the shaft 69, the gear 68 carried by the lower extremity of the latter, will be moved in an eccentric path towards its companion gear 65. Upon proper engagement being had between the teeth of the gears just referred to, the worm-wheel 92 is again tightened to securely hold the element 71 in adjusted position. The adjustments hereinbefore mentioned, can be effected independent of the relative positions of the connected housing and casing 33 and 40 respectively, with regard to the support 11.

In its broader aspect, the invention is not limited to the precise features of construction and arrangements of parts herein shown and described, nor to any particular means of which it can be carried into effect, as many changes may be made in the details without departing from the principles of the invention and without sacrificing its chief advantages.

What I desire to secure by Letters Patent of the United States and claim is:—

1. A device of the type specified, including flexibly coupled substantially aligned shafts, a spindle disposed in the plane of the axis of said shafts perpendicularly thereto, interengaging gears carried by one of the aligned shafts and said spindle, an adjustable element guiding said aligned shaft capable of deflecting the same, and means for accurately adjusting said element serving to deflect the last mentioned shaft slightly out of alignment from the one coupled thereto, deflection of the shaft carrying one of said gears acting to vary the meshing engagement between the teeth of the latter and those of the gear on the spindle.

2. A device of the type specified, including divided substantially aligned shafts, a spindle disposed in the plane of the axis of said shafts and perpendicularly thereto, interengaging bevel gears carried by the adjacent portions of one of the aligned shafts and said spindle, an element guiding said aligned shaft capable of deflecting the same, means for accuratetly adjusting said element serving to deflect said adjacent portion of the last named shaft slightly out of alignment with the other one of said shafts, the deflection of the shaft carrying one of said gears acting to vary the meshing engagement of the teeth on the latter with those of the gear on the spindle, and other means coupling the aligned shafts admitting of flexure therebetween to accommodate the one thereof subjected to deflection.

3. In mechanism of the type described, the combination of a main housing, a casing transverse to one end thereof, a shaft journalled in said casing, a bevel gear on said shaft, a drive at the upper end of said housing having a shaft portion, a second shaft in substantial alignment with the latter, a coupling flexibly connecting said portion and said second shaft, a bevel gear on the extremity of the second shaft remote from said coupling, said last named gear co-operating with the one first mentioned, a sleeve member for said extremity of the said second shaft disposed in proximity to its gear, said member being rotatably adjustable in the housing and provided with a slightly eccentric bore guiding the second shaft, an adjusting gear on the member, means accessible from the exterior of the housing for revolving said gear and the member to adjust the meshing engagement of the co-operating bevel gears, a locking gear also engageable with the member and arranged to bear on said adjusting gear, and other means capable of actuation from the outside of the said housing adapted to operate said locking gear and thereby secure the said member in adjusted position.

4. In mechanism of the type specified, the combination of a main housing, a supporting element coaxial with said housing revolvably carried at one end thereof, quickly operable means for holding said support in angularly adjusted position, a casing arranged transversely to said element, a shaft journalled in said casing, a bevel gear on said shaft, a drive at the upper end of the housing having a shaft portion, a second shaft in substantial alignment therewith, a coupling flexibly connecting said portion with said second shaft, a bevel gear on the

lower end of the second shaft co-operating with the first mentioned gear, a sleeve member for the end of the last named shaft adjacent its gear, said member being revolvably adjustable in the supporting element and provided with a slightly eccentric bore, a radial bearing intermediate said bore and the said second shaft, a thrust bearing therefor coacting with the member, and adjusting gear on the latter, means accessible exteriorly of the element for operating said adjusting gear and the said member serving to control the meshing engagement of the bevel gears, a locking gear threadingly engaging the sleeve member and arranged to bear on the adjusting gear, and other means also operable from the outside of the supporting element capable of actuating said locking gear, thereby clamping the sleeve member in adjusted position.

5. Gear supporting and adjusting mechanism comprising a housing, a sleeve member revolvably carried thereby having a slightly eccentric axial bore, a shaft passing therethrough, a radial anti-friction bearing in said bore guiding said shaft, an anti-friction thrust bearing coacting with the shaft and said member, an adjusting gear connected to the latter, a worm revolubly mounted within the housing engaging said adjusting gear, a locking gear having threaded engagement with the member arranged to bear upon the adjusting gear, another worm also within the said housing engageable with said locking gear, and extensions to said adjusting and locking gear engaging worms disposed exteriorly of the housing and by means of which they may be operated to adjustably position the sleeve member and to lock the same in such position.

6. Gear supporting and adjusting mechanism comprising a housing formed with an internal abutment, a sleeve member rotatably mounted in said housing having a shoulder contacting with one side of said abutment, said member having an eccentrically offset axial bore, a shaft passing therethrough, a radial bearing in said bore guiding said shaft, a thrust bearing coacting with the shaft and the sleeve member, an adjusting gear connected to the latter bearing against the opposite side of the said abutment, a spindle journalled in the housing, a worm on said spindle within the housing engaging said adjusting gear, a locking gear having threaded engagement with the member arranged to bear on the adjusting gear, another spindle also having a worm within the said housing engageable with said locking gear, and means disposed exteriorly of the housing by means of which said spindles may be operated to adjust and lock the sleeve member in position.

JULIUS WEGNER.