H. CORRALL.

SEWING MACHINE DRIVING DEVICE.

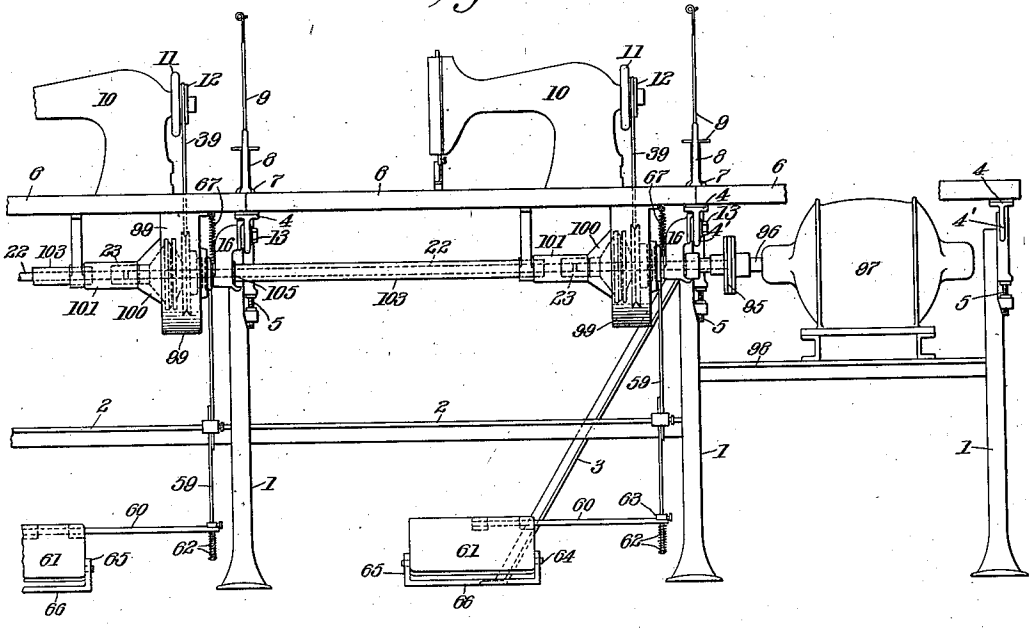
APPLICATION FILED OCT. 19, 1912.

1,147,377.

Patented July 20, 1915.

3 SHEETS—SHEET 1.

Fig. 1.



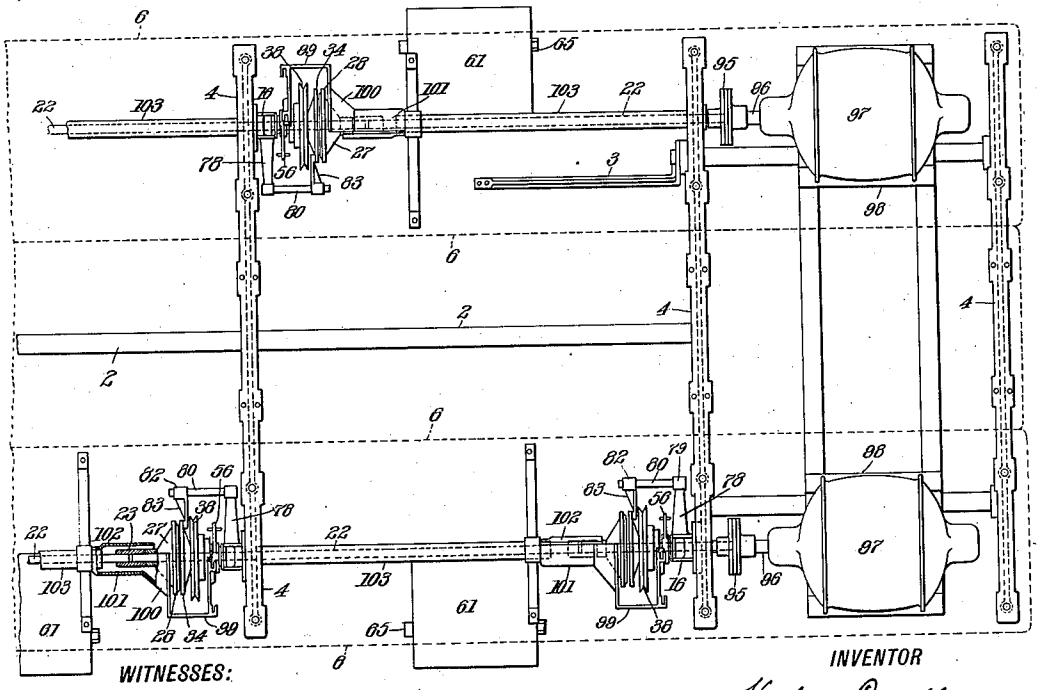


Fig. 2.

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3 SHEETS—SHEET 2.

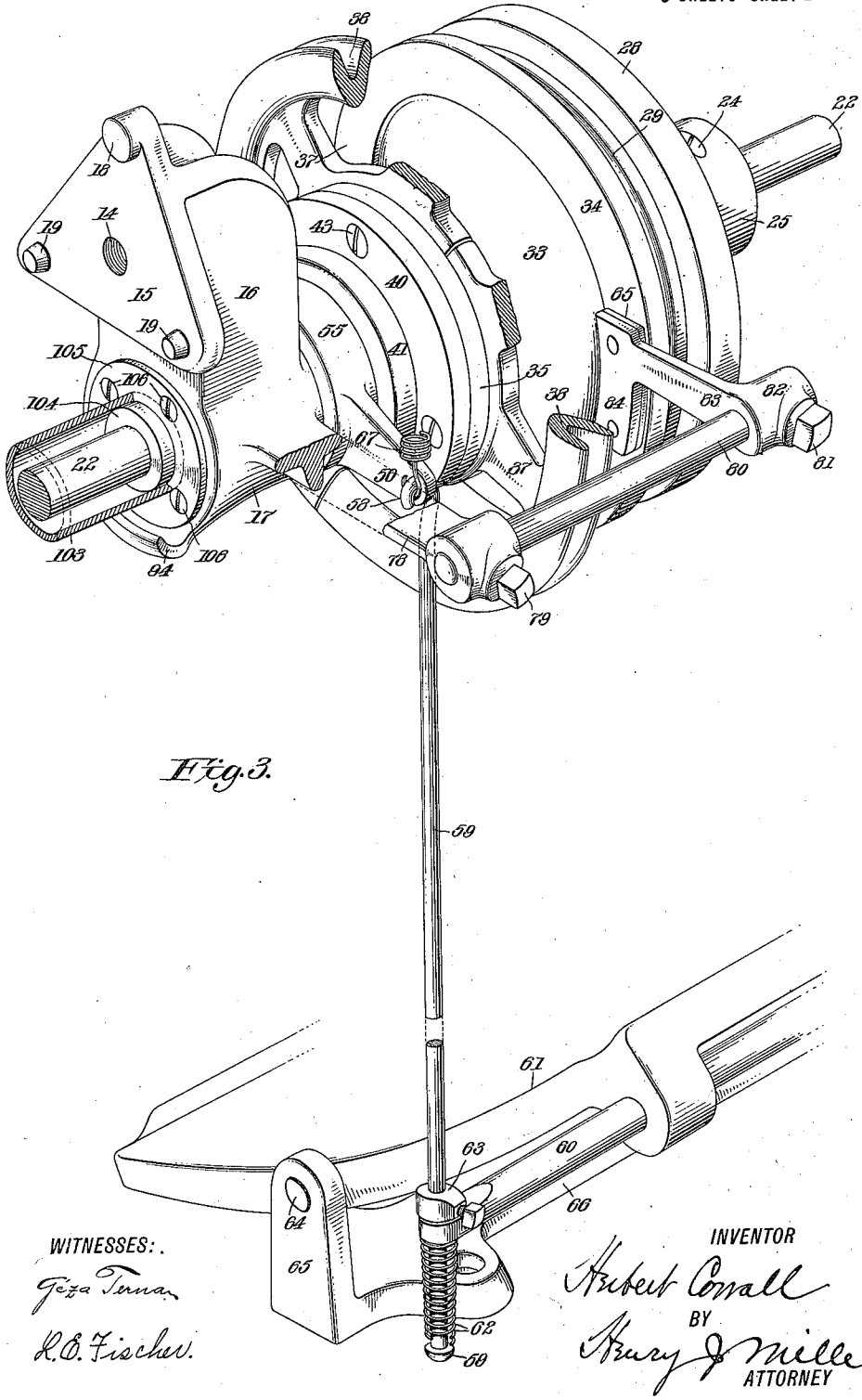


Fig. 3.

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3 SHEETS—SHEET 3.

Fig. 4.

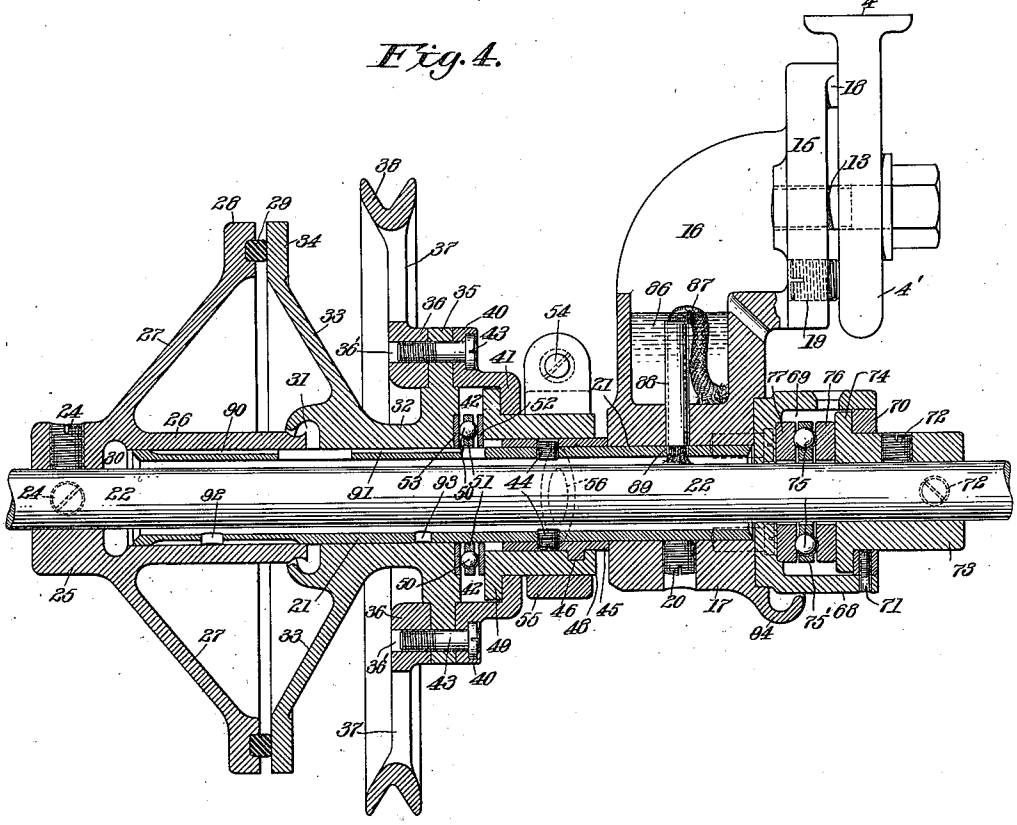


Fig. 5.

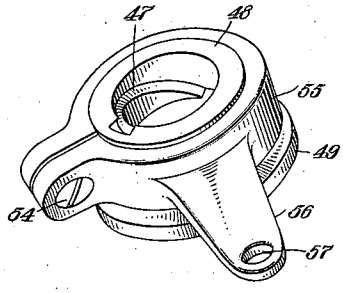
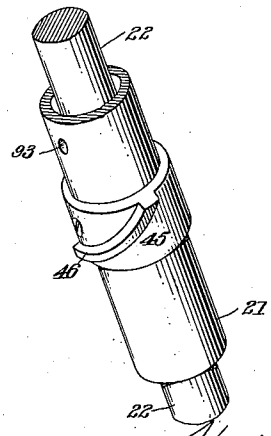


Fig. 6.



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SEWING-MACHINE DRIVING DEVICE.

1,147,377. Specification of Letters Patent. Patented July 20, 1915.

Application filed October 19, 1912. Serial No. 726,758.

To all whom it may concern:

Be it known that I, HERBERT CORRALL, a subject of the King of the United Kingdom of Great Britain and Ireland, residing at Parkview, Helensburgh, Dumbartonshire, Scotland, have invented certain new and useful Improvements in Sewing-Machine Driving Devices, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates particularly to an improvement in under drivers for use with power benches carrying a number of sewing machines driven from a rotating shaft beneath, and it has for its object to equip a bench with all the moving parts, such as shafts, pulleys and belts fully inclosed so that the operators are guarded from danger of accident, while also insuring that on stopping any one of the sewing machines the belt and driving pulley for that machine will also be stopped.

The bench comprises the usual table which is preferably clamped to the upper rail of standards or legs of each section by bolts or studs formed on the lower side of a bench strap having formed upon its upper side a combined work-shield and cotton-stand, this arrangement obviating the necessity of fitting separately to the bench the requisite work-shields and cotton-stands.

In lieu of the ordinary arrangement of main-shaft and belts operating transmitters with belt-pulleys for driving the several machines, a single driving shaft is used which extends the full length of the bench directly under the row of sewing machines, and preferably made up of short lengths corresponding with the spacing apart of the machines and united by suitable couplings. This shaft is driven either directly or by a belt connection at one end from an electric or other motor, and is provided beneath each machine with a loose belt-pulley coupled by a belt to the machine above, said pulley being carried on a stationary bearing-sleeve or bushing mounted in a hanger depending from the table.

Each loose belt-pulley is driven from the rotating shaft by a friction-disk or driving clutch-member thereon; the pulley being rigidly connected with a driven clutch-member pressed against the face of the driving clutch-member by the action of a foot-treadle coupled to a lever-arm on a screw-threaded sleeve on the stationary bearing sleeve or bushing. Upon the release of the foot-treadle, the loose pulley is forcibly retracted and disengaged from the driving clutch-member preparatory to the action of an opposed stationary brake-pad, or the like, in overcoming its momentum to arrest the driven machine wholly subsequent to the removal of the driving force. In the preferred construction of this under driver, the belt-pulley is attached by bolts or screws to the hub or boss of a flanged cone or disk constituting the driven clutch-member which is normally slightly out of contact with a leather or other friction ring sunk in the face of the disk or flanged cone secured upon the rotating shaft and constituting the driving clutch-member. This disk or cone rotates on a bearing formed by a stationary bearing sleeve surrounding but not contacting with the shaft and carried by a bracket or hanger adjustably secured to the top rail so as to facilitate the lining up of the shaft. This sleeve also affords a bearing for the hub of the loose pulley. By this arrangement the shaft is freed from the strain caused by driving effort or tight belts.

The screw-threaded sleeve operated from the foot-treadle is fitted on the stationary bushing and arranged to bear on the stationary sleeve or boss for shifting the loose belt-pulley into or out of operative relation with the rotating driving clutch-member. Change in the normal speed of each sewing machine may be readily made by constructing the loose pulley in separable sections detachably secured to its hub, and by providing for each under driver a set of interchangeable sectional pulleys.

A guard or shield secured to the under side of the bench protects the operator from the pulley when rotating, and a tubular non-rotating sleeve extends over each length of the shaft between such guard or shield and the adjacent under driver. By these means all rotating or moving parts are effectively shielded from the operator, and even the driving belts and their actuating pulleys are at rest when the machines are not in operation, so that the operators may apply or run such belts and perform various adjustments without any danger whatever of injury from moving parts.

The present construction, as thus briefly described, permits the employment of a very light continuously running driving shaft which carries substantially no load when the machines are not in operation, and therefore runs quietly and requires a very small amount of power to turn it. The size of this shaft is thus determined merely by the strength required to overcome the torsional resistance of the load imposed thereon by the series of sewing machines when in operation, the end thrust imposed thereon by the pressure of the opposed clutch-members being sustained by an anti-friction thrust bearing preferably provided at one end. The driving shaft intermediate this end bearing is evidently sustained against lateral bending or displacement by the hub of the driving pulley fixed thereon which is journaled upon the exterior of the rigid bearing sleeve of each hanger.

The under driver of the present invention is self-contained and its several parts, with the exception of the driving-shaft sections and driving clutch-members fixed thereon, may be assembled and adjusted in their relation to each other at the factory in which they are made, so that the work of installation upon the power-bench is reduced to a very small item, the shaft-sections and driving clutch-members being readily applied after the hangers with the parts carried thereby are secured in position. As the stationary bearing sleeve is materially larger in diameter than the shaft, it will be observed that they form in conjunction an annular oil-cavity closed at one end by the driving clutch-member secured upon the shaft and at the opposite end by suitable means, ducts being provided between the interior and exterior surfaces of the bearing sleeve for distribution of the lubricant upon the journals of the rotating parts mounted thereon. The construction is thus dust-proof and oil-proof and is capable of operation continuously for long periods of time without special attention of the user in cleaning the bearings and applying lubricant thereto.

By sustaining the shaft entirely out of direct contact with the several separated hangers, the grinding thereof to fit the usual bearings is obviated and the usual degree of precision in its lining up is obviously not required. Provision is readily made for self-lubrication of the journals and the shaft may be designed to a minimum size for transmission of rotary motion, thereby providing a light-weight shaft requiring little power for driving it.

In the drawings, Figure 1 is an elevation and Fig. 2 a plan of a work-bench provided with the present improvements. Fig. 3 is a perspective view of the under-driver. Fig. 4 is a sectional elevation of the under-driver, Fig. 5 a perspective view of the clutch-controlling cam and Fig. 6 a similar view of a portion of the bearing sleeve and the bushing therefor provided with the spiral rib or screw-thread, with a portion of the driving shaft.

The bench is shown constructed with the separated legs or standards 1 connected above the floor by the tie-members 2 and provided with the inclined braces 3 to insure rigidity. Upon the upper rails 4, which are adjustably sustained by means of the screws 5 passing through suitably apertured bosses thereof, are clamped the adjacent extremities of the table sections 6 by means of the bench-straps 7 and suitable clamp-bolts (not shown), these straps having formed integral therewith the work-shields 8 and spool-stands 9. Upon each table section is a sewing machine head 10 in the bracket-arm of which is journaled the usual main-shaft carrying the balance-wheel 11 with grooved belt-wheel 12 through which the power is transmitted for operating the stitch-forming and feeding mechanisms.

Each of the rails 4 has a depending web 4′ to one face of which is secured by means of a bolt 13 entering the threaded aperture 14 the foot 15 of a laterally and downwardly extending hanger 16 formed with the transversely apertured boss 17. The foot 15 is shown formed upon the face adjacent the web 4′ with an integral stud 18 and is also provided upon the other side of the threaded aperture 14 with the screws 19, the projection of whose points beyond the same may be varied to adjust the position of the hanger to bring its boss in alinement with that of the adjacent hangers. Fitted within the boss 17 and secured therein by means of one or more set-screws 20 is the stationary bearing sleeve 21 projecting from one end of the same and affording an extension thereof upon which are journaled the rotating parts of the under-driver.

Freely passing through the several bearing sleeves 21 are the driving shaft sections 22 formed in lengths substantially the same as the table sections 6 and connected together near the outer extremities of the bearing sleeves by means of couplings 23. Upon each shaft section 22 is secured by means of set-screws 24 the centrally apertured overhanging extension 25 of the hub 26 of a driving clutch-pulley formed with the conical body 27 and annular flange 28 grooved in its outer face to receive the friction-ring 29, the hub 26 being fitted upon the outer end of the bearing sleeve 21 which sustains it for free rotation and enables the clutch-member in turning to afford a support for the driving shaft section. The hub 26 is formed slightly beyond the extremity of the sleeve 21 with the annular oil-recess 30 surrounding the shaft 22, and its opposite extremity projects within a similar oil-recess

31 formed in the adjacent end of the hub 32 of the driven clutch-member which is journaled upon the bearing sleeve 21 and is provided with the conical body portion 33 terminating in the annular flange 34 whose outer face is adapted to contact with the friction-ring 29 when the parts are thrown in driving relation.

The hub 32 has formed thereon the disk 35 provided in its opposite faces with annular seats to one of which is fitted the hub 36 of the sectional belt-wheel 37 formed in its rim with the belt-groove 38 to receive the driving belt 39 encircling the belt-wheel 12 by means of which the sewing machine is driven. To the opposite seat of the disk 35 is applied the ring 40 with outwardly offset annular lip 41 forming with the disk 35 an annular cavity 42. The parts 36 and 40 are detachably secured to the disk 35 by means of the screws 43 tapped into threaded apertures 36′ of the hub 36.

Fitted upon and rigidly secured to the bearing sleeve 21 by means of screws 44 is the bushing 45 formed with the helical rib or screw-thread 46 which enters the similarly shaped cam-groove 47 of the collar 48 loosely fitted upon such bushing and provided at one extremity with the annular flange 49 entering the cavity 42 and interposed between the lip 41 of the ring 40 and the adjacent end of the hub 32. Disposed within the cavity 42 is shown a series of anti-friction balls 50 embraced by the spacing ring 51 and adapted to roll in contact with the wearing rings 52 and 53 interposed between the same and the flange 49 and hub 32, respectively, to afford an anti-friction step-bearing to receive the thrust of the driven clutch-member when the under-driver is in operation.

The collar 48 is fitted to and adjustably secured by means of the clamp-screw 54 within the split-hub 55 of a lever 56 formed in its outer end with an aperture 57 entered by the hooked upper end 58 of the treadle-rod 59 passing through the apertured outer end of the bar 60 sustained by the treadle-plate 61 and formed at its lower end with the head 59′ between which and the bar 60 is interposed the buffer-spring 62 by means of which the adjustable thrust-collar 63 applied to the treadle-rod 59 above the bar 60 is maintained normally seated upon the latter. The treadle-plate is provided with the usual fulcrum-pins 64 entering apertures in the lugs 65 of the floor-plate 66, and the rocking of the treadle-plate serves to turn the clutch-controlling collar 48 in opposite directions so as to force the driven clutch-member into and out of operative relation with the driving clutch-member. The lever 56 is normally maintained yieldingly in its upper position for retraction of the driven clutch-member from the driving clutch-member by means of the spring 67 connected at one end with the hooked extremity 58 of the treadle-rod and at the opposite end with an eye secured in the bottom of the table-section 6.

As represented in Fig. 4, one of the hangers 16, and preferably that nearest the source of power, is provided in the face opposite the projecting portion of the bearing sleeve 21 with a cylindrical box 68 loosely embracing the shaft 22 at its inner end and affording a thrust-bearing cavity 69 containing in its outer end the overhanging ring 70 secured in position by screws 71. Secured upon the shaft 22 by means of set-screws 72 is the thrust-collar 73 formed with the annular lip 74 entering the cavity 69 and interposed between the ring 70 and the bottom or inner end of the cavity. This cavity is provided, similarly to the cavity 42, with a series of anti-friction balls 75 embraced by the spacing ring 75′ and adapted to roll in contact with the wearing rings 76 and 77 interposed between the same and the flange 74 and the inner end of the box 68, respectively. By this means, the single anti-friction thrust bearing receives the longitudinal pressure imposed upon the shaft by each of the several under-drivers when the respective driven machines are in operation, but it will be observed that when the clutch-members are not in operative relation all strain upon the driving shaft is removed, the weight of such parts being sustained wholly by the bearing sleeves carried by the several hangers.

Each of the hangers 16 is provided with a rigid lateral arm 78 formed with a transverse socket in which is secured by means of the set-screw 79 the bar 80 disposed substantially parallel with the main-shaft 22 and having adjustably secured upon its free end by means of the set-screw 81 the hub 82 of a rigid arm 83 formed with the brake-shoe 84 having the facing 85 of leather or other suitable material adapted to engage the back of the flange 34 of the driven clutch-member. In the retracted position of the driven clutch-member the flange 34 is maintained forcibly in engagement with the stationary brake-shoe and the driven parts are held against movement; but in the advance of the driven clutch-member into operative relation with the driving clutch-member the former recedes from engagement with the brake-shoe and is thus freed for rotation by operative connection with the driving shaft.

As represented in the drawings, the hangers 16 are formed above the bosses 17 with oil reservoirs 86 each communicating with an annular oil-chamber or cavity formed in the space between the shaft section 22 and the respective surrounding bearing sleeve 21 by means of the wicking 87 passing

through the supply tube 88 having its upper end in the upper portion of the reservoir and its lower end communicating through the aperture 89 with the interior of the sleeve 21. The sleeve 21 is provided in the journal portions for the clutch-hubs 26 and 32 with the longitudinal distributing grooves 90 and 91, respectively, such journals being in communication with the interior of the sleeve through radial apertures 92 and 93, respectively. The oil-recesses 30 and 31 formed in the hubs 26 and 32 are provided to stop the flow of any oil issuing from the ends of the journals of rotating parts, and the curved lip 94 formed at the lower side of the hanger-boss 17 to produce an oil-receptacle is similarly provided to catch the drip of oil from the adjacent bearing.

As represented in Figs. 1 and 2, the bench is constructed for two lines of sewing machines, and hence it is provided with parallel series of table sections 6 and correspondingly arranged sectional driving shafts of which one of the end sections is connected by means of a suitable coupling 95 with the shaft 96 of an electric-motor 97 sustained by the shelf 98 extending between two of the standards 1, the motors being preferably installed for independent operation. It is evident, however, that any other suitable driving means may be provided for turning the driving shafts.

As represented in Figs. 1 and 2, each of the under-drivers is embraced upon the side adjacent the operator by a shield 99 having a conical projection 100 upon the side adjacent the driving clutch-member which terminates in the hub portion 101 embracing the adjacent shaft coupling 23 and formed with a cap 102 to admit the latter in assembling the parts. The shield 99 is secured to the under side of the table section 6 and affords a housing for the belt 39 beneath the same. The outer end of the hub 101 affords a socket in which is secured one end of a sleeve or tube 103 surrounding the driving shaft and having its opposite end sustained by the boss 104 projecting from a plate 105 secured by screws 106 to the adjacent face of the hanger 16. By means of the shield 99 100 101 and the sleeve 103, all of the moving parts are effectively guarded from the operator or her clothing.

Having thus set forth the nature of the invention, what I claim herein is:—

1. In a driving device, a driving shaft, a hanger, a bearing sleeve sustained by said hanger and embracing said shaft, a driving clutch-member having a hub journaled upon said bearing sleeve and formed with an extension secured upon said shaft, a driven clutch-member having a hub journaled upon said bearing sleeve, and means for establishing and interrupting operative relation between said driving and driven clutch members.

2. In a driving device, a hanger, a bearing sleeve sustained thereby, driving and driven clutch-members mounted for relative reciprocal axial movement upon said bearing sleeve, and the former having a hub overhanging the bearing sleeve, means for shifting the driven clutch-member toward and from the driving clutch-member for establishing and interrupting operative relation between the same, and a driving shaft extending through said bearing sleeve and secured within the overhanging portion of said hub of the driving clutch-member.

3. In a driving device, a driving shaft, a plurality of hangers, a bearing sleeve sustained by each of said hangers and embracing said driving shaft, sliding and rotating clutch members each having a hub journaled upon one of said bearing sleeves and formed with an extension secured upon said shaft, driving clutch-members each adapted for cooperation with one of said driven clutch members and having a hub journaled upon one of the bearing sleeves, and independent means for establishing and interrupting operative relation between each of said driving clutch-members and its respective driven clutch-member.

4. In a driving device, a bearing, driving and driven clutch-members directly mounted thereon and adapted for independent rotation and relative axial movement, a shaft upon which is fixed one of said clutch-members affording a support therefor, and means for producing axial movement of said clutch-members for establishing and interrupting driving relation between them.

5. In a driving device, a bearing, driving and driven clutch-members directly mounted thereon, and adapted for independent rotation, and the latter axially movable toward and from the former, a shaft upon which is fixed the driving clutch-member affording a support therefor, a cam element rigidly connected with said bearing, a rotary and axially movable collar having a positive connection with said driven clutch-member and having a cam element coöperating with the first-named cam element, and means for turning said collar for axially shifting the driven clutch-member.

6. In a driving device, a bearing, driving and driven clutch-members directly mounted thereon and adapted for independent rotation and relative axial movement, a cam element also fixed upon said bearing, a shaft upon which is fixed one of said clutch-members affording a support therefor, a rotary and axially movable collar having a positive connection with one of said clutch-members and provided with a cam element cooperating with the first-named cam element, and means for rocking said collar to produce

relative axial movements of said clutch-members for establishing and interrupting driving relation between them.

7. In combination, a driving shaft, a plurality of driving clutch-members fixed upon and spaced apart lengthwise of said shaft, a plurality of bearings each having journaled thereon one of said driving clutch-members, and driven clutch-members adapted for engagement each with its respective driving clutch-member and also journaled upon the respective bearing thereof.

8. In combination, a driving shaft, a plurality of bearings surrounding said shaft, a plurality of clutch-members each fixed upon said shaft adjacent one of said bearings by which said member is sustained against movement transverse to the length of the shaft, and clutch-members sustained independently of the shaft and provided with independent means whereby they may be moved into and out of driving relation with the clutch-members upon said shaft.

9. In a driving device, a driving shaft, a plurality of separated hangers each apertured to embrace said shaft without contact therewith, a bearing sleeve carried by each hanger and also embracing said shaft, a series of driving clutch-members secured upon and affording spaced supports for said shaft and each journaled upon one of said bearing sleeves, a series of driven clutch-members each adapted for engagement with one of said driving clutch-members and journaled upon the exterior of a bearing sleeve, and means for establishing and interrupting operative relation between said driving and driven clutch-members.

10. In combination, a driving shaft, a plurality of bearings surrounding said shaft, pairs of interengaging clutch-members each having one of its component members fixed upon the shaft adjacent one of said bearings, means for establishing and interrupting driving relation between said clutch-members, and tubular housings for said shaft extending lengthwise thereof throughout the space or spaces intermediate said bearings and adjacent clutch-members.

11. In combination, a driving shaft, a plurality of bearings surrounding said shaft, a plurality of clutch-members each fixed upon said shaft adjacent one of said bearings by which said member is sustained against movement transverse to the length of the shaft, clutch-members sustained independently of the shaft and provided with mutually independent means whereby they may be moved into and out of driving relation with the clutch-members upon said shaft, and tubular housings for said shaft extending lengthwise thereof throughout the space or spaces intermediate said bearings and adjacent clutch-members.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

HERBERT CORRALL.

Witnesses:
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HENRY A. KORNEMANN, Jr.