Oct. 31, 1933. J. D. KARLE 1,932,974

DRIVING DEVICE

Filed April 6, 1932 2 Sheets-Sheet 1

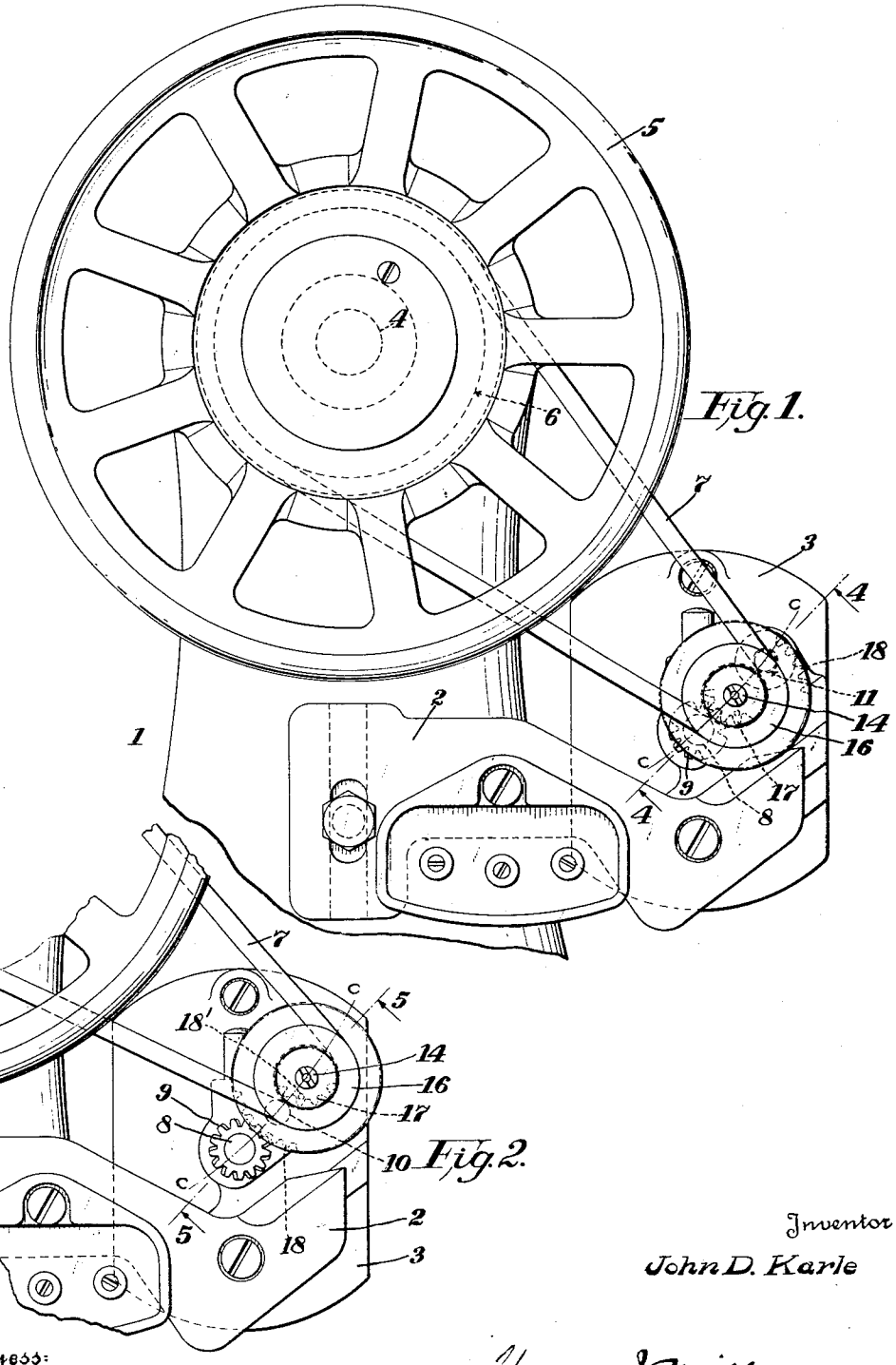


Fig. 1.

Fig. 2.

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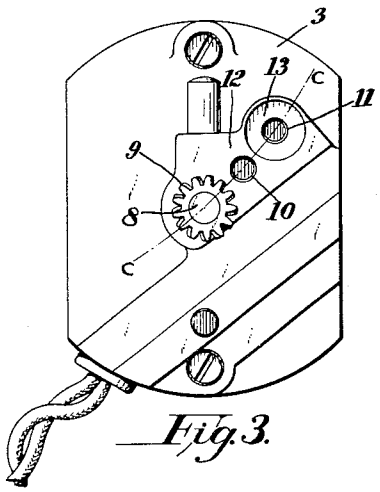


Fig. 3.

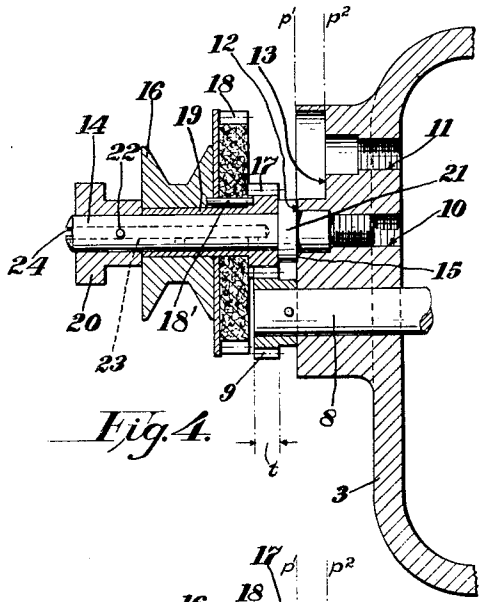


Fig. 4.

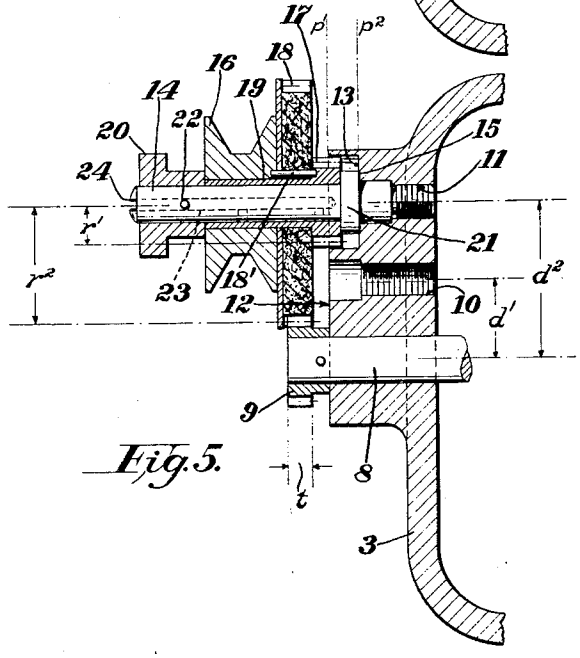


Fig. 5.

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Patented Oct. 31, 1933 1,932,974

UNITED STATES PATENT OFFICE

1,932,974

DRIVING DEVICE

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Application April 6, 1932. Serial No. 603,536

6 Claims. (Cl. 74—57)

This invention relates to variable speed driving devices and has for an object to provide a simple, compact and inexpensive drive which is adapted more particularly for use in motor-driven sewing machine outfits to enable the ratio of the speed of the motor-shaft to that of the sewing machine shaft to be increased when desired, to better enable the machine speed to be varied and controlled by the operator particularly in embroidering and darning operations where low machine speeds with increased power are desired.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations, and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

Fig. 1 is a rear end elevation of a motor driven sewing machine embodying the invention; the gearing being set to drive the small belt pulley at the same speed as the motor-shaft. Fig. 2 is a similar view with the gearing set to drive the small pulley at a reduced speed. Fig. 3 is an end elevation of the motor with the small pulley and its supporting stud removed. Fig. 4 is a section on the line 4—4, Fig. 1, and Fig. 5 is a section on the line 5—5, Fig. 2.

1 represents the vertical standard of the sewing machine frame or gooseneck to which is secured the supporting bracket 2 for the motor-frame 3; the elements 1, 2 and 3 being all rigidly associated and constituting a united framework. The bracket 2, the motor-frame 3 and parts therewithin are preferably constructed substantially in accordance with the respective disclosures in the U. S. patents to Diehl et al., No. 1,488,234, of Mar. 25, 1924, and Hemleb, No. 1,520,949, of Dec. 30, 1924. Journaled in the gooseneck 1 is the sewing machine main-shaft 4 carrying the usual balance-wheel 5 having a belt-pulley groove 6 for the belt 7. Journaled in the motor-frame 3 is the motor-shaft 8 to the outer end of which is fixed the pinion 9.

The motor-frame 3 is formed with two threaded apertures or sockets 10, 11 at different distances d^1, d^2, respectively, Fig. 5, from the axis of the motor-shaft 8. The apertures 10, 11 are formed at their mouths with seats 12, 13, respectively, in different planes p^1, p^2, the distance between which is at least equal to the thickness t of the gear 9.

Selectively received in either of the apertures 10, 11 is a stud-pin 14 having a flange 21, the shoulder 15 of which is in engagement with the respective one of said seats 12, 13. Journaled on the stud-pin 14 is the small belt-pulley 16 and the coaxial gears 17, 18 having different pitch radii r^1 and r^2, Fig. 5. The pulley 16 and coaxial gears 17, 18 are all rigidly pinned together at 18'. The small gear 17 may be formed with a long bearing hub 19 on which the pulley 16 and large gear 18 are fixed. The pulley and gear assembly 16, 17, 18, is confined against movement endwise of the stud-pin 14 by the end-collar 20 and intermediate flange 21. The collar 20 is fixed to the stud 14 by the pin 22. The stud 14 is formed with an oil hole 23 and screw-driver slot 24.

In the present instance the gears 9 and 17 have 13 teeth each while the gear 18 has 36 teeth. The difference between the center distances d^1 and d^2 is equal to the difference between the pitch radii r^1 and r^2 of the respective gears 17 and 18. Hence the stud-pin 14 may be screwed home in either of the sockets 10 and 11 with one or the other of the gears 17, 18 in mesh with the pinion 9 on the motor-shaft. The arrangement of the seats 12, 13 in different planes locates one or the other of the coaxial gears 17, 18 in the plane of the driving pinion 9 in either selected position of the coaxial gear and small pulley assembly.

It will also be observed that the centers of the sockets 10, 11 as well as the axis of the motor-shaft 8 are on the arc c—c of a circle concentric with the main-shaft 4 of the sewing machine. Thus the same standard endless belt 7 may be used for any selected position of the small belt-pulley 16.

When the stud-pin 14 is screwed into the socket 10, Fig. 4, the motor-shaft pinion 9 meshes with the gear 17 and drives the pulley 16 at the same speed as the motor-shaft, thus driving the sewing machine at a speed determined by the ratio of the diameters of the belt-pulleys 6 and 16, as heretofore. Under this condition, however, it is difficult to start and control the speed of the sewing machine at low speeds such as used in embroidering and darning operations; the tendency being, as the usual motor-controller is depressed, for the machine to resist starting until the static friction of the bearings is overcome and then to jump ahead at too high a speed for embroidering and like work.

By shifting the stud-pin 14 to the position shown in Fig. 5, the speed ratio is reduced and

the power ratio correspondingly increased. This enables the machine to be easily started without overthrow of the controller. It also enables the proper low machine speeds to be easily attained and easily held by the operator without fatigue.

The gear 18 is preferably made of a non-metallic fibrous material, such as laminated fabric impregnated with phenolic resin, such material being well known to the workers in the gear art.

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

1. The combination with a frame, a shaft journaled in a fixed position in said frame, and a pinion mounted in a fixed position on said shaft, of a belt-pulley, a plurality of gears coaxial with and fixed to said belt-pulley, and means for rotatably supporting said belt-pulley and coaxial gears with any selected one of said gears in mesh with the pinion on said shaft.

2. The combination with a frame, a shaft journaled in said frame, and a pinion fixed to said shaft, of a belt-pulley, a plurality of gears coaxial with and fixed to said belt-pulley, and means detachably mounted on said frame for rotatably supporting said belt-pulley and coaxial gears with any selected one of said gears in mesh with the pinion on said shaft.

3. The combination with a frame, a shaft journaled in said frame, and a pinion fixed to said shaft, said frame having a plurality of sockets at different distances from said shaft, of a stud-pin detachably secured in a selected one of said sockets, a belt-pulley, a pair of gears coaxial with and fixed to said belt-pulley, said belt-pulley and coaxial gears being journaled on said stud-pin with one of said coaxial gears meshing with the pinion on said shaft, the difference between the distances of the sockets from the shaft-axis being equal to the difference between the pitch-radii of the coaxial gears.

4. The combination with a pair of shafts, a belt-pulley on one of said shafts, and a pinion on the other of said shafts, of a second belt-pulley, a pair of gears coaxial with and fixed to said second belt-pulley, a framework in which said shafts are journaled, said framework having a pair of sockets spaced equidistantly from the one shaft and at different distances from the other shaft, and a stud-pin detachably received in either of said sockets, said second belt-pulley and coaxial gears being journaled on said stud-pin with one or the other of said coaxial gears in mesh with the gear on the other of said shafts.

5. The combination with a pair of shafts, of a belt-pulley on one of said shafts, a pinion on the other of said shafts, a second belt-pulley, a pair of gears coaxial with and fixed to said second belt-pulley, a framework in which said shafts are journaled, and a stud-pin detachably connectible to said framework in a selected one of two different predetermined positions equidistant from the one shaft and at different distances from the other shaft, said second belt-pulley and coaxial gears being journaled on said stud-pin with one or the other of said coaxial gears in mesh with the pinion on the other of said shafts.

6. The combination with a frame, a shaft journaled in said frame, and a pinion on said shaft, of a stud-pin having a shoulder, a belt-pulley, a pair of coaxial gears fixed to said belt-pulley, said belt-pulley and coaxial gears being journaled on said stud-pin, said frame having a plurality of apertures adapted to selectively receive said stud-pin, said frame also having seats in different planes for the shoulder of said stud-pin, the distance between the planes of said seats being at least equal to the thickness of the pinion on said shaft, and the difference between the distances of said apertures from said shaft being equal to the difference between the pitch-radii of said coaxial gears.

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