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P. DIEHL.

BELT TRANSMISSION IN SEWING MACHINES.

APPLICATION FILED JULY 11, 1906.

Fig. 1.

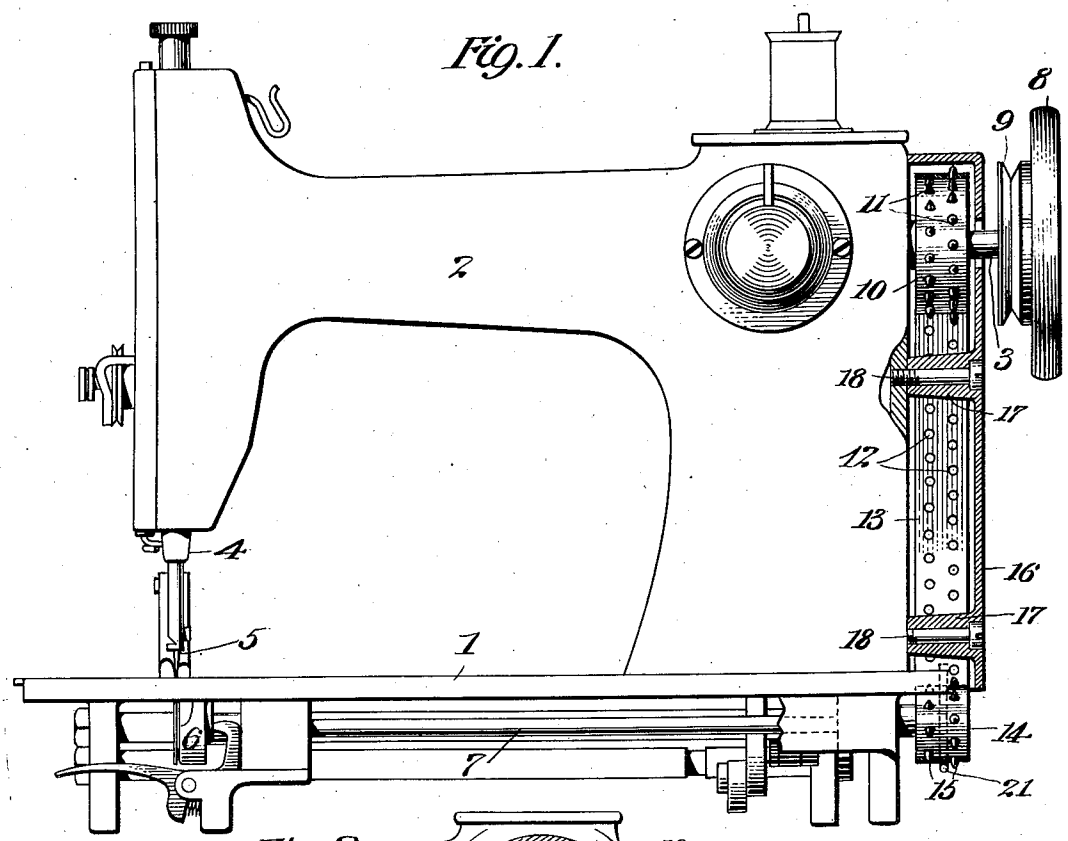
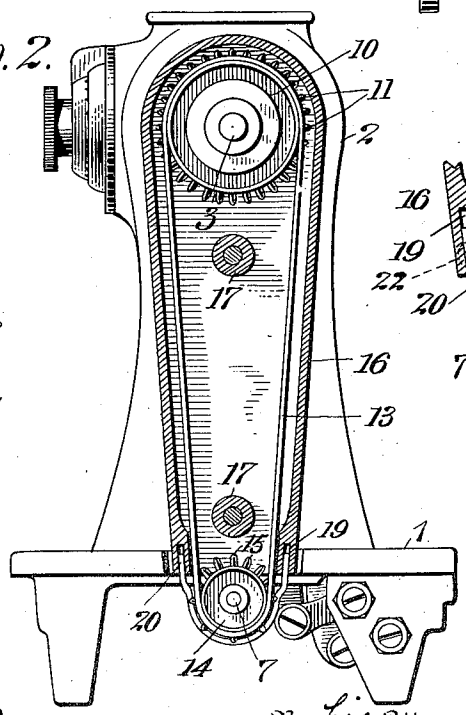


Fig. 2.



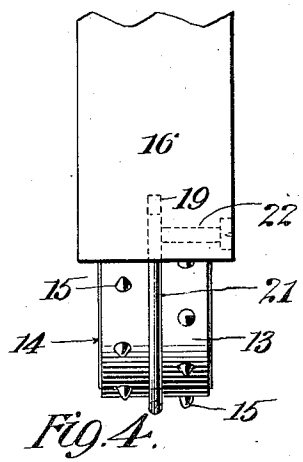


Fig. 4.

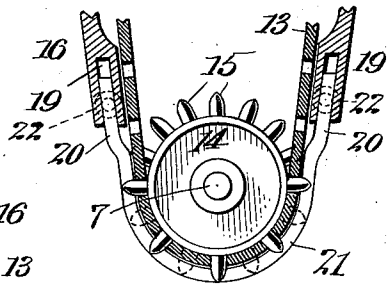


Fig. 3.

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UNITED STATES PATENT OFFICE.

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BELT TRANSMISSION IN SEWING-MACHINES.

No. 862,240. Specification of Letters Patent. Patented Aug. 6, 1907.

Application filed July 11, 1906. Serial No. 325,577.

To all whom it may concern:

Be it known that I, PHILIP DIEHL, a citizen of the United States, residing at Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Belt Transmission in Sewing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to an improvement in that class of high-speed sewing machines comprising rotary needle actuating and loop-taker actuating shafts journaled respectively above and below the bed-plate and driven at different speeds, and the invention has for its object to provide a non-metallic belt-connection between the pin-pulleys commonly applied to their respective shafts in such manner as to insure against the slippage of the belt over the pins so as to disturb the timing of the coöperating members of the stitch-forming mechanism.

Heretofore it has been common to employ pulleys with single annular rows of belt-engaging pins and belts similarly provided each with a single row of holes to be entered by said pins, but, as the smaller and more rapidly driven pin-pulley necessarily had the pins spaced apart some distance in order to avoid the weakening of the belt and pulling out of the holes, only a few of such pins were active at a time and these proved insufficient, in case of even slight abnormal resistance imposed upon the loop-taker shaft, to prevent the displacement of the belt in respect of such pins. In such prior construction it was also proposed to employ a belt-guard having two parallel members adapted to straddle the outer ends of the pins of the smaller wheel.

By the present improvement I am enabled to dispose the belt-engaging pins as close together peripherally as may be required to insure the positive retention of the belt in the proper relation with the smaller driven pulley, and this is accomplished by arranging the peripheral pins in the pulleys in two or more parallel annular rows, the pins of one row being opposite the spaces in the adjacent row or rows, and in providing the belt with two or more rows of holes in corresponding arrangement. By this means one of the guard members for the belt may be dispensed with, the single guard member, which is preferably made in the form of a rod or wire bent into U-shape, embracing the smaller or driven pulley between its rows of peripheral pins, and thus forming a common retaining device acting in conjunction with both the adjacent rows of pins in retaining the belt in proper relation with the pulley.

In the drawings annexed, Figure 1 is a side elevation of a sewing machine of the Singer revolving hook type embodying the present improvement, with the belt housing and a portion of the bracket-arm and the belt represented in section, and Fig. 2 is a rear end view of the sewing machine with the belt housing in section and the balance wheel removed. Fig. 3 is an enlarged partial sectional end view of the lower pin-pulley and the adjacent parts, and Fig. 4 is a side elevation of the same.

The frame of the machine is constructed with the usual bed-plate 1 and the overhanging bracket-arm 2, in which is journaled the main shaft 3 having the usual operative connection with the needle-bar 4 carrying the needle 5 coöperating in the stitch-forming operation with the revolving hook 6 mounted upon the rotary shaft 7 journaled in suitable bearings beneath the bed-plate. The rotary main-shaft 3 is provided upon its extreme rearward end with the usual balance-wheel 8 with grooved pulley 9 adapted to be connected by the usual belt with the source of power, and is provided adjacent the rear end of the bracket-arm with a pulley 10 having two rows of belt-engaging peripheral pins 11 arranged in two annular rows and adapted to enter correspondingly arranged holes 12 in the non-metallic endless band 13 serving as a power transmitting belt between the pulley 10 and a smaller pulley 14 upon the rearward end of the loop-taker actuating shaft 7 and similarly provided with annular rows of peripheral pins 15. As will be observed by reference to the drawings, the pins of each row upon both pulleys are disposed in a line intermediate the spaces between the pins of the other row, whereby the effective pitch of the pins is one-half their distance apart in the respective rows, while no weakening of the belt is produced by such reduction of the pitch. It being one of the primary objects of the present improvement to arrange the positioning pins in as close peripheral spacing as possible consistent with the maintenance of the requisite strength in the belt 13, these pins and the corresponding holes in the belt are in practice so arranged that the distance of one from those in the adjacent row is not less than its distance from the adjacent ones in the same row. In other words, the distance of a pin in one row from the nearest one in the adjacent row is not less than the spacing of the pins in the first-named row.

As represented in the patent to Martin Hemleb, No. 809,566, dated Jan. 9, 1906, the present machine is provided with a housing 16 of rectangular cross-section applied to the rear end of the bracket-arm to inclose the pin-wheels 10 and 14 and the connecting belt 13, perforated studs 17 being provided in said housing through which are extended the fastening screws 18 entering threaded apertures in the bracket-arm for securing the housing firmly but removably in position. The lower end of the housing 16 is pro-

vided upon opposite sides with substantially vertical sockets 19 entered by the upturned extremities 20 of the two limbs of a U-shaped belt-guard 21 preferably formed of a round wire or rod and bent in such manner as to embrace the pulley 14 intermediate its two rows of belt-engaging pins 15. The two limbs of the belt-guard 21 are movable within their sockets 19 for adjustment of the curved operative portion in relation to the periphery of the pulley 14, and they are adapted to be secured in such adjustment by means of transverse set-screws 22.

As will be observed, in order to replace an old belt with a new one, it is only necessary to remove the balance-wheel by loosening its fastening set-screws and to then detach the belt housing with the belt-guard carried thereby so as to render both pulleys accessible for the purpose, the removal of the belt-guard making it a simple matter to slip the belt over the pins of one of the pulleys to disengage it therefrom and to apply the new belt in a similar manner.

The present improvement, by insuring a comparatively close spacing peripherally, or in the direction of motion of the pins and the apertures in the belt which they enter, insures the maintenance of timing between the two shafts by preventing the slipping of the belt, while the staggered arrangement of such interengaging parts avoids impairing the strength of the belt which would result from arranging the pins and their receiving apertures in a single row, and the durability of the belt is consequently materially increased. Also, by the provision of two spaced rows of pins upon the pulleys I am enabled to make a single piece of wire perform the double function of retaining the belt upon the two adjacent rows of pins, thus affording the simplest and most effective form of belt guard which exposes both marginal portions beyond the pins for inspection and avoiding the addition of any objectionable receptacle adapted for the lodgment of dirt. The application of such guard to the removable housing for the belt affords the simplest possible means of access for the renewal of the belt when required.

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

1. In a sewing machine, the combination with the frame comprising a bed-plate and a bracket-arm, a rotary needle actuating shaft journaled in the bracket-arm and a rotary loop-taker actuating shaft mounted beneath the bed-plate, of pulleys of different diameters mounted upon the said rotary shafts and each provided with series of peripheral pins arranged in a plurality of annular rows with those of each row disposed intermediate those of the adjacent row, a flexible non-metallic endless belt connecting said pulleys and provided with rows of apertures similarly disposed and adapted to receive their peripheral pins, and a stationary guard formed of a thin rod or wire bent into U-shape embracing one of said pulleys intermediate its rows of peripheral pins and exposing the marginal portions of the belt beyond said pins.

2. In a sewing machine, the combination with the frame comprising a bed-plate and a bracket-arm, a rotary needle actuating shaft journaled in the bracket-arm and a rotary loop-taker actuating shaft mounted beneath the bed-plate, of pulleys of different diameters mounted upon the said rotary shafts and each provided with series of peripheral pins arranged in a plurality of annular rows with those of each row disposed intermediate those of the adjacent row and each pin arranged at a distance from those nearest in the adjacent row not less than its distance from the adjacent pins in its own row, a flexible non-metallic endless belt connecting said pulleys and provided with rows of apertures similarly disposed and adapted to receive their peripheral pins, and a stationary guard embracing one of said pulleys intermediate its rows of peripheral pins and adjustable in respect of the axis of rotation of said pulley.

3. In a sewing machine, the combination with the frame comprising a bed-plate and a hollow bracket-arm, a rotary needle actuating shaft journaled in the bracket-arm, and a rotary loop-taker actuating shaft mounted beneath the bed-plate, of pulleys of different diameters mounted upon the said rotary shafts and rearward of said bracket-arm and each provided with series of peripheral pins arranged in a plurality of annular rows with those of each row disposed intermediate those of the adjacent row and each pin arranged at a distance from those nearest in the adjacent row not less than its distance from the adjacent pins in its own row, a flexible non-metallic endless belt connecting said pulleys and provided with rows of apertures similarly disposed and adapted to receive their peripheral pins, a housing inclosing said pulleys and the connecting belt, means for removably securing said housing to the bracket-arm, and a guard carried by said housing and embracing one of said pulleys intermediate its rows of peripheral pins.

4. In a sewing machine, the combination with the frame comprising a bed-plate and a hollow bracket-arm, a rotary needle actuating shaft journaled in the bracket-arm, and a rotary loop-taker actuating shaft mounted beneath the bed-plate, of pulleys of different diameters mounted upon the said rotary shafts and rearward of said bracket-arm and each provided with series of peripheral pins arranged in a plurality of annular rows with those of each row disposed intermediate those of the adjacent row, a flexible non-metallic endless belt connecting said pulleys and provided with rows of apertures similarly disposed and adapted to receive their peripheral pins, a housing inclosing said pulleys and the connecting belt, means for removably securing said housing to the bracket-arm, and a guard carried by and adjustable in respect of said housing and embracing one of said pulleys intermediate its rows of peripheral pins.

5. In a sewing machine, the combination with the frame comprising a bed-plate and a hollow bracket-arm, a rotary needle actuating shaft journaled in the bracket-arm, and a rotary loop-taker actuating shaft mounted beneath the bed-plate, of pulleys of different diameters mounted upon the said rotary shafts and rearward of said bracket-arm and each provided with series of peripheral pins arranged in a plurality of annular rows, a non-metallic endless belt connecting said pulleys and provided with rows of apertures adapted to receive their peripheral pins, a housing inclosing said pulleys and the connecting belt, means for removably securing said housing to the bracket-arm, a guard for said belt comprising a round rod bent into U-shape to embrace the lower of said pulleys intermediate its rows of peripheral pins with the upturned extremities of its limbs fitted adjustably in sockets therefor in the lower end of said housing, and set-screws applied to said housing for maintaining the guard in position.

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

PHILIP DIEHL.

Witnesses:
HENRY J. MILLER,
HENRY A. KORNEMANN.