Aug. 29, 1933. F. E. BANFIELD, JR., ET AL 1,924,176

ROVING FRAME

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Fig. 1

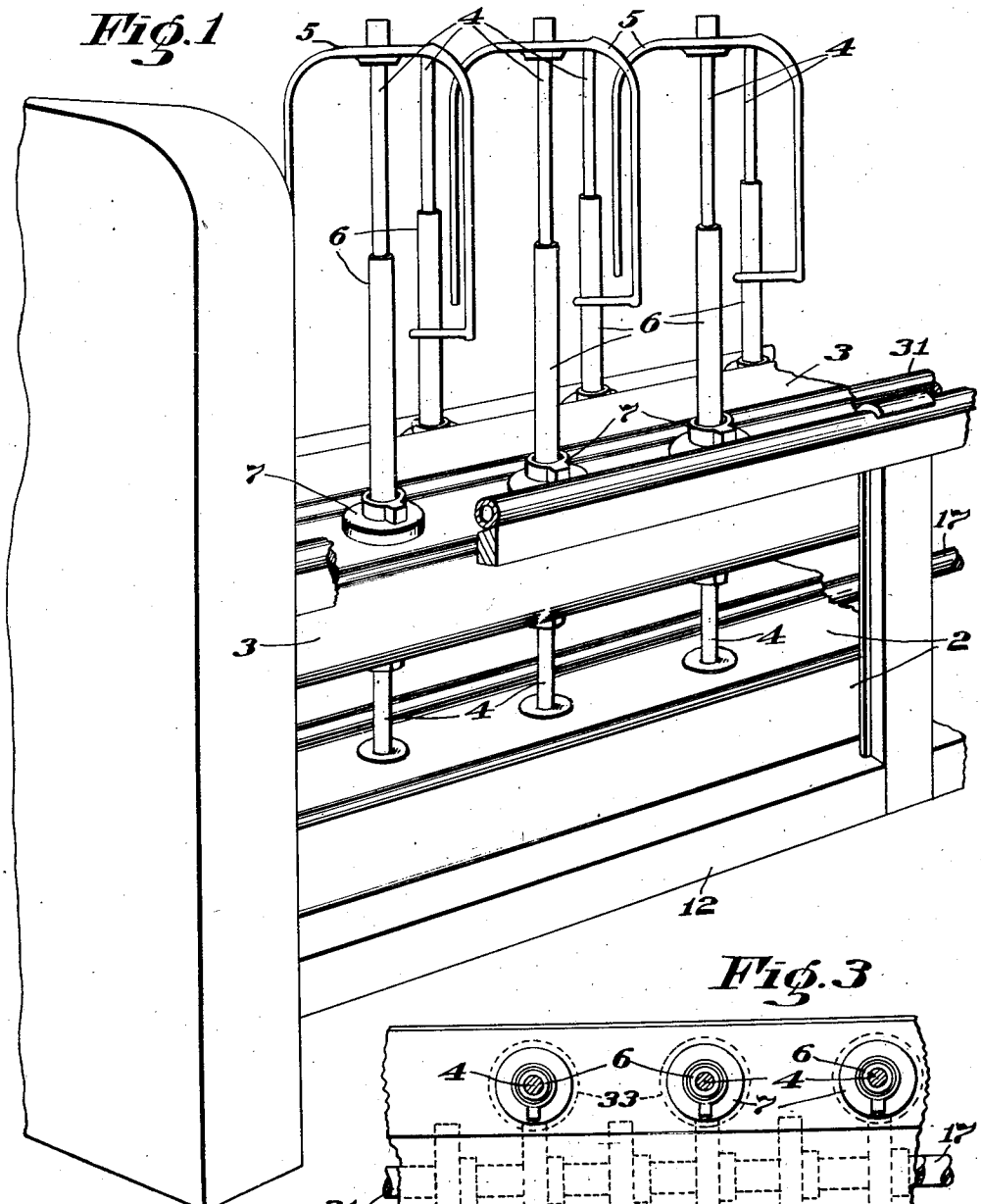


Fig. 3

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Fig. 2

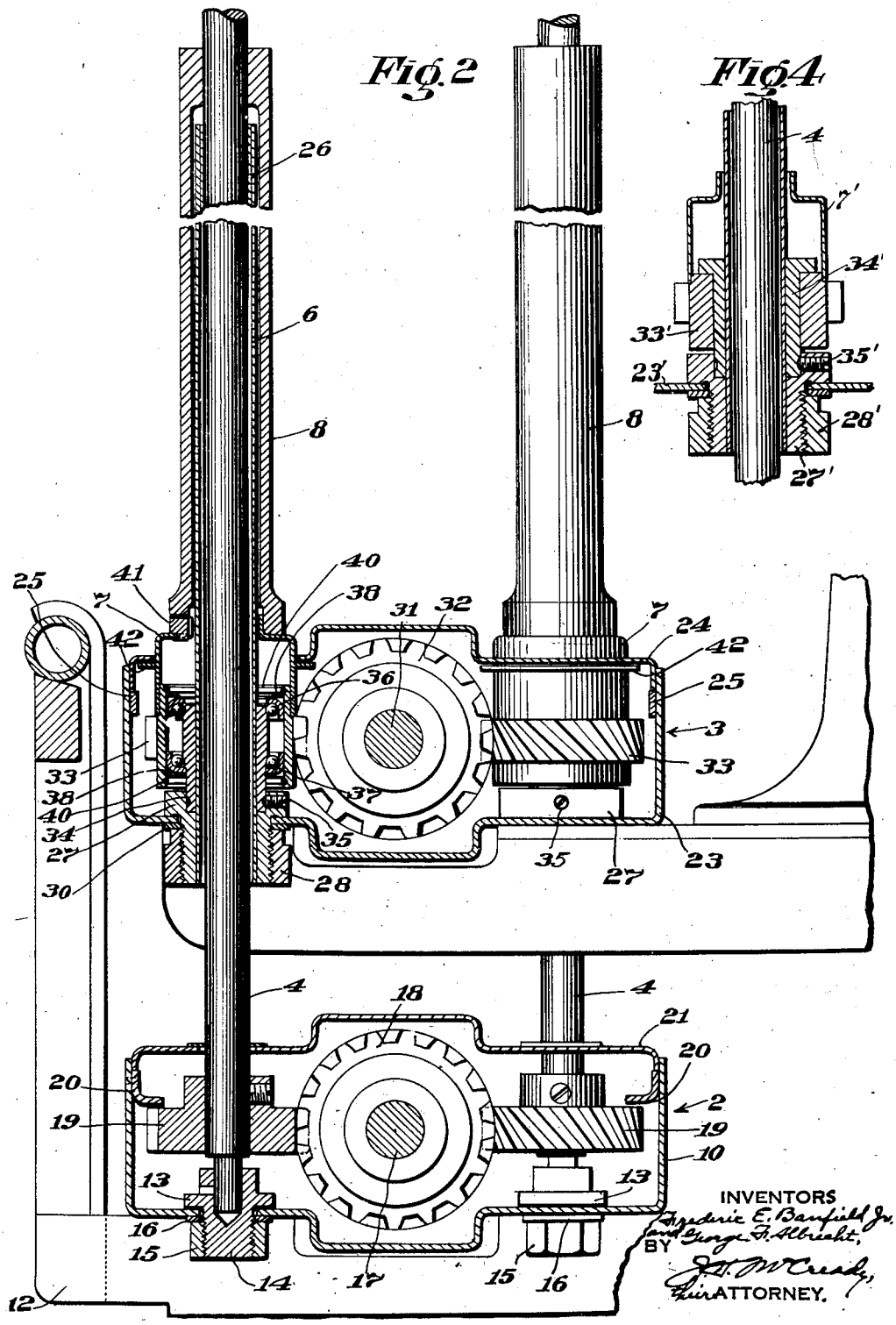


Fig. 4

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Patented Aug. 29, 1933 1,924,176

UNITED STATES PATENT OFFICE

1,924,176

ROVING FRAME

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Application July 1, 1931. Serial No. 548,141

8 Claims. (Cl. 118—45)

This invention relates to roving frames and more especially to the mechanisms for supporting and driving the bobbins and spindles of machines of this character. In machines of this type the spindles carry flyers and extend through bolsters around which the bobbins revolve. The bobbin rail is given a traversing movement and the bobbin gears or pinions are driven by "skew" gears mounted on a horizontal driving shaft. This arrangement is very noisy, proper lubrication of the gears in it is difficult, wear is relatively rapid, and the power consumption is comparatively high.

The present invention aims to improve the driving mechanisms for both the spindles and the bobbins with a view to producing a quieter and smoother running machine, increasing the length of life of the mechanism, reducing the power consumption, and devising a mechanism which can be manufactured more economically.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawings, and the novel features will be particularly pointed out in the appended claims.

In the drawings,

Figure 1 is a perspective view showing a portion of a roving frame embodying features of this invention;

Fig. 2 is a transverse, vertical, sectional view through the bobbin and spindle rails of the machine shown in Fig. 1;

Fig. 3 is a plan view of a part of the mechanism; and

Fig. 4 is a vertical, sectional view illustrating a modification.

The machine shown in the drawings, like any standard roving frame, includes a spindle rail 2 and a bobbin rail 3, the latter rail being mounted above and in line with the former. Upright spindles 4 are supported in the spindle rail and are arranged in two horizontal rows spaced apart transversely of the rail, the individual spindles in one row being staggered with reference to those in the other row. At their upper ends these spindles support flyers, certain of which are shown at 5 in Fig. 1. The bobbin rail supports a series of bolsters 6 through which the respective spindles 4 extend, and associated with each bolster is a bobbin support 7 for a bobbin 8. In these respects the machine shown is essentially like prior roving frames.

The mechanism provided by this invention for supporting and driving the spindles and bobbins is illustrated in Fig. 2. By referring to this figure it will be seen that the spindle rail 2 comprises a lower section 10 made of sheet metal and mounted on supports 12 forming parts of the machine frame. A series of step bearings 13 are secured in the bottom of this section of the rail to support the lower ends of the upright spindles 4. Each of these bearings has a screw threaded shank 14 which projects through a hole in the bottom of the rail to receive a nut 15 which clamps the bearings securely to the rail section 10, a washer 16 of some yielding material, such as leather, cork or fibre, being interposed between the nut and the rail to make a tight joint at this point. For the purpose of driving these spindles a horizontal drive shaft 17 is mounted in the spindle rail 2 between the two rows of spindles, and carries a series of spiral gears, one of which is shown in Fig. 2 at 18, for meshing with and driving the respective spiral gears 19 on the individual spindles 4. Welded or otherwise secured to the inner sides of the rails are two horizontal angular strips 20—20 which overlie the two rows of spiral gears 19 and serve to prevent any substantial upward movement of any of these gears away from their operative positions. The upper section or cover 21 of the spindle rail simply rests on the strips 20—20 and may be readily lifted off, this cover being provided with holes through which the spindles 4 extend.

The bobbin rail 3 is similar in construction to the spindle rail and includes a lower sheet metal section 23 and a readily removable upper section or cover 24, the cover resting on strips 25—25 welded to the inner side walls of the lower section. This rail supports the bolsters 6, each bolster consisting of a metal tube having a bearing sleeve or bushing 26 forced into its upper end to engage the respective spindle 4 which runs through it. Each bolster is supported in a bolster base 27 having a screw threaded shank which projects through an aperture in the bottom of the rail section 23 to receive a nut 28 which clamps the base to the rail. A washer 30 is interposed between the nut and the bottom of the rail. The bolster is rigidly secured to the base 27 by being forced into the hole or bore in the base.

For the purpose of driving the bobbins a driving shaft 31 is mounted horizontally in the rail 3 and carries a series of spiral gears, one of which is shown at 32, for meshing with and driving the respective bobbin gears 33. Each of these bobbin gears is supported on ball bear-

ings, as shown at the left of Fig. 2. The preferred construction comprises an inner race 34 which is set into a counter bore in the upper end of the bolster base 27 and is secured therein by a set screw 35. Upper and lower outer races 36 and 37 are positioned in the upper and lower portions, respectively, of the bobbin gear 33 and a series of balls is interposed between each of these outer races and the inner race 34. Each of the outer races is held in its operative position by a retaining washer 38 backed up by a split spring ring 40, the ring being snapped into a groove formed in the inner surface of the bobbin gear 33. The bobbin support 7 is forced on to the upper end of the bobbin gear so that it is fixed to said gear and carries the usual driving lug 41 for the bobbin 8. An oil ring 42 is carried by this bobbin support and is located just below the cover 24 where it serves to prevent oil from working out through the hole in the cover provided to take the support 7.

When the machine is in operation the spiral gear drive between the shaft 31 and the bobbins will exert an upward thrust on certain of the driven gears 33 and a downward thrust on others. This thrust in either direction is transmitted through the ball bearings to the inner race 34 but the rigid mounting of this race in the bolster base 27 effectually resists the thrust in both directions.

The invention thus provides a driving mechanism which is radically different from those heretofore used in machines of this type and is much superior to them both from a mechanical and an operating standpoint. The lower sections of the two rails 2 and 3 are adapted to hold an ample supply of oil or other lubricant in contact with the spiral gears so that the running parts are constantly and thoroughly lubricated. This not only increases the life and serviceability of the driving mechanism for the bobbins and spindles, but materially reduces the noise which has always been excessive in machines of this type. A substantial saving in power also is effected, partly by the improved lubrication and partly by the use of ball bearings. The elimination of skew gears is an especially desirable feature. In addition, the weight of the rails and the parts associated with them have been reduced, and a substantial economy in the expense of manufacture is effected since most of the parts can be made either in automatic screw machines or from sheet metal by suitable punches and dies.

Features of this invention are also useful when ball bearings are not used to support the bobbin gears. Such an arrangement is illustrated in Fig. 4 in which the bobbin gear 33' is mounted on a bearing bushing 34' which is seated in the counter bore formed in the upper end of the bolster base 27', the bushing being held in its seat by the set screw 35'. Any upward movement of the bobbin gear 33' due to the thrust exerted on it by the spiral gear which drives it is prevented by the laterally extending shoulder provided at the upper end of the bearing bushing 34'.

While we have herein shown and described a preferred embodiment of our invention, it will be understood that the invention may be embodied in other forms without departing form the spirit or scope thereof.

Having thus described our invention, what we desire to claim as new is:

1. In a roving frame, the combination of a rail comprising a sheet metal lower section, a series of step bearings secured in the bottom of said section and cooperating with said section to form an oil tight reservoir for supplying oil to said bearings, a series of upright spindles mounted, respectively, in said bearings, said spindles being arranged in two rows with the individual spindles in one row staggered with reference to those in the opposite row, a driving shaft located horizontally in said rail section between said rows of spindles, spiral gears carried by said shaft and rotating therewith, additional spiral gears on said spindles driven by the spiral gears on said shaft, and a removable cover for said lower section.

2. In a roving frame, the combination of a bobbin rail, a bolster base supported in said rail, an upright hollow bolster carried by said base, an inner ball race mounted on said base, a bobbin gear encircling said ball race and having means for supporting a bobbin, upper and lower outer ball races located between said inner race and said gear, balls operatively positioned between said inner and outer races, and retaining washers carried by said gear and holding said upper and lower outer races in their operative positions.

3. In a roving frame, the combination of a bobbin rail comprising a sheet metal lower section, a plurality of spindles extending through said rail and arranged in two parallel rows, the individual spindles in one row being staggered with reference to those in the opposite row, means for supporting and driving said spindles, a series of hollow bolsters through which said spindles extend, respectively, a series of bolster bases mounted in said rail and supporting said bolsters, respectively, bobbin gears associated with said bolsters and each having means to support a bobbin in cooperative relationship to its respective bolster, ball bearings interposed between each bolster and its respective bobbin gear and supporting the gear in its operative position, a shaft in said rail section lying between said rows of spindles and extending horizontally of the rail, a series of spiral gears carried by said shaft and driving said respective bobbin gears, and a cover for said lower rail section removably mounted on the latter section and serving to protect said gears, said lower rail section being adapted to hold a quantity of lubricant in contact with said spiral gears.

4. In a roving frame, the combination of a bobbin rail, a bolster base supported in said rail, a tubular bolster mounted in said base and carried thereby, a bobbin gear having means for supporting a bobbin, ball bearings interposed between said bolster and said gear for supporting said gear both for rotary motion around said bolster and also against vertical movement, and a driving gear meshing with said bobbin gear for revolving the latter gear.

5. In a roving frame, the combination of a bobbin rail, a bolster base supported in said rail, a tubular bolster fitting in said base and supported thereby, an inner ball race mounted on said base and encircling said bolster, upper and lower outer ball races, balls operatively positioned between said inner and outer races, a bobbin support carried by said outer races, and means for revolving said bobbin support.

6. In a roving frame, the combination of a bobbin rail comprising a sheet metal lower sec-

tion, a plurality of spindles extending through said rail and arranged in two parallel rows, the individual spindles in one row being staggered with reference to those in the opposite row, means for supporting and driving said spindles, a series of hollow bolsters through which said spindles extend, respectively, a series of bolster bases mounted in said rail and supporting said bolsters, respectively, bobbin gears associated with said bolsters and each having means to support a bobbin in cooperative relationship to its respective bolster, bearings interposed between said bolsters and their respective bobbin gears and supporting the gears in their operative positions, a shaft in said rail section lying between said rows of spindles and extending horizontally of the rail, a series of spiral gears carried by said shaft and driving said respective bobbin gears, and a cover for said lower rail section mounted on the latter section and serving to protect said gears, said lower rail section being adapted to hold a quantity of lubricant in contact with said spiral gears.

7. In a roving frame, the combination of a rail comprising a sheet metal lower section, a series of step bearings each including a threaded shank extending through the bottom of said section and a nut threaded on said shank for clamping said bearing in said bottom section, said step bearings cooperating with said section to form an oil tight reservoir for supplying oil to said bearings, a series of upright spindles mounted, respectively, in said bearings, said spindles being arranged in two rows with the individual spindles in one row staggered with reference to those in the opposite row, a driving shaft located horizontally in said rail section between said rows of spindles, spiral gears carried by said shaft and rotating therewith, and additional spiral gears on said spindles driven by the spiral gears on said shaft.

8. In a roving frame, the combination of a bobbin rail, an upright bolster carried by said rail, said bolster being hollow for the passage therethrough of the spindle, a bobbin gear mounted to rotate around said bolster, a bearing for said bobbin gear interposed between the bolster and the gear, and means cooperating with said bearing to cause the bearing to support said bobbin gear against any substantial vertical movement in either direction while maintaining the running conditions of said bearing substantially undisturbed by thrusts tending to produce such vertical movement.

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