July 24, 1956 B. P. PINKVOSS 2,755,755

SEWING MACHINE FEED WHEEL CONSTRUCTIONS

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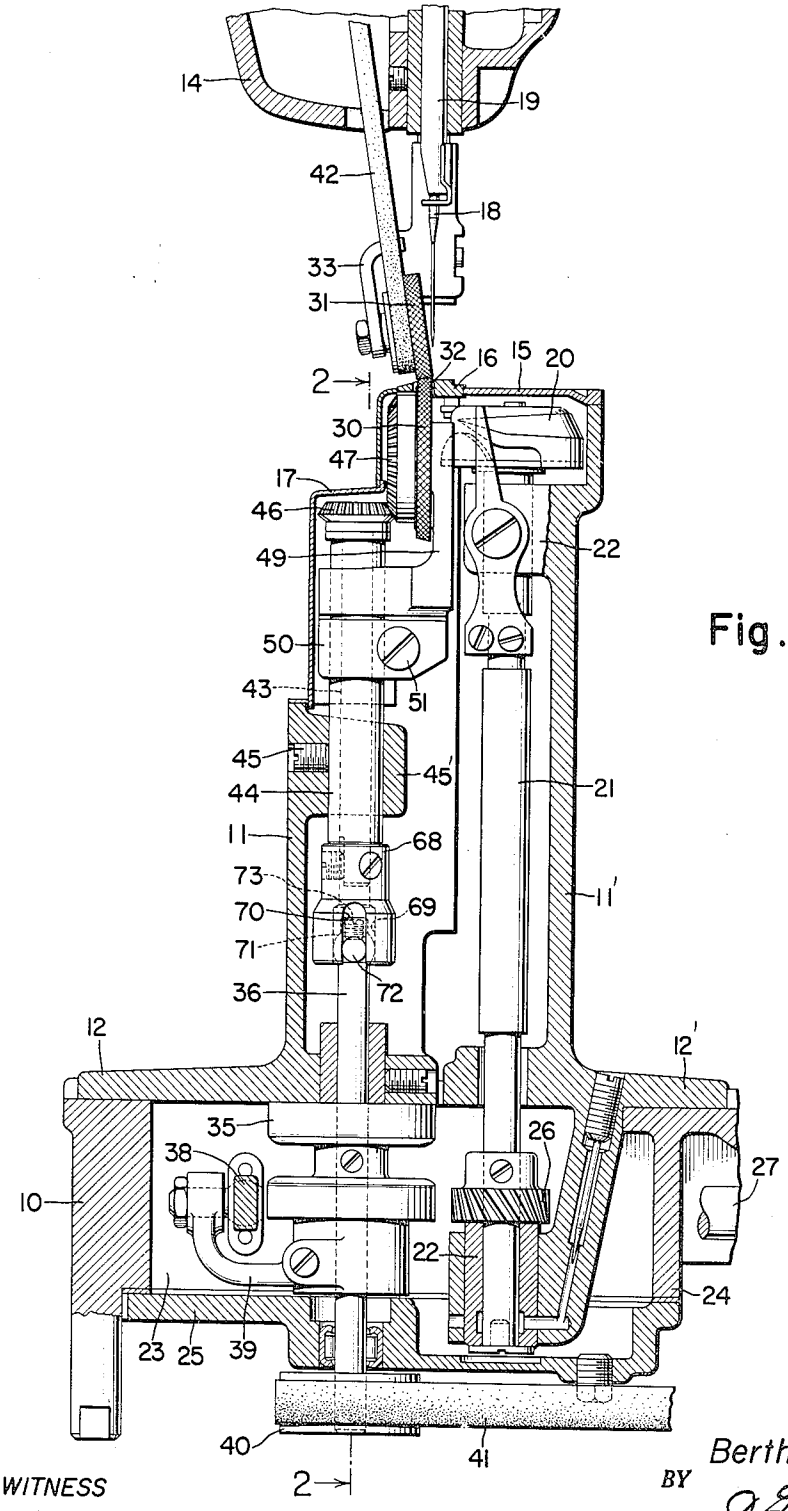


Fig. 1.

WITNESS

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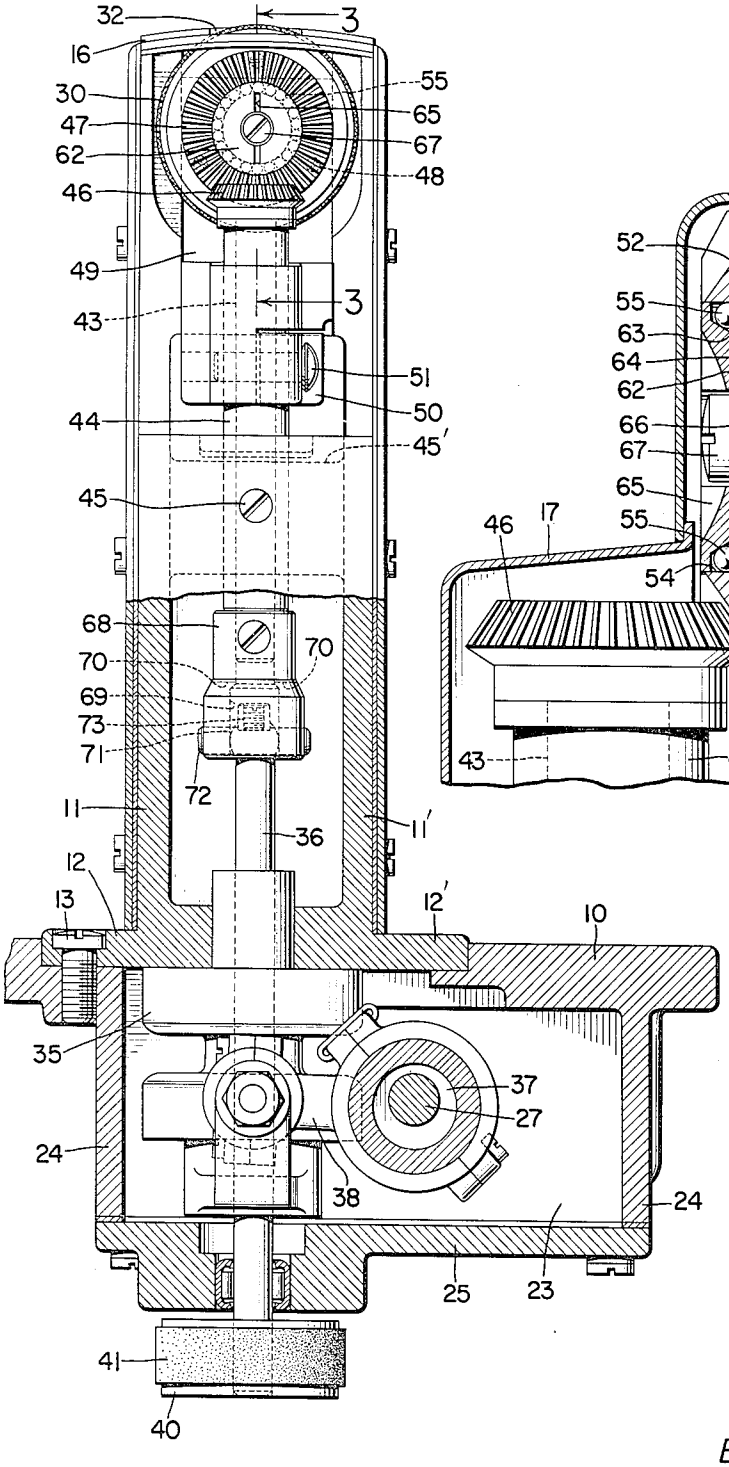


Fig. 2.

Fig. 3.

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SEWING MACHINE FEED WHEEL CONSTRUCTIONS

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Application December 29, 1953, Serial No. 401,003

4 Claims. (Cl. 112—214)

This invention relates to a feed wheel arrangement for a sewing machine, and more particularly, to a feed wheel construction which is particularly well adapted for use with a sewing machine of the type having an upstanding post upon which the work is supported during the stitching operation.

One object of this invention is to provide a ball bearing support for a sewing machine feed wheel in which a relative adjustment between the ball bearing raceways may be attained in a novel and convenient manner, and with which a nicety of adjustment may be obtained to insure smooth operation.

A further object of this invention is to provide a means for reestablishing both a proper meshing relation of the gear drive for the feed wheel as well as the desired elevation of the feed wheel with respect to the work-supporting post after adjustment of the ball bearing raceways has been made.

With these and other objects and advantages in view as will hereinafter appear, this invention comprises the devices, combinations, and arrangements of parts hereinafter described and illustrated in the accompanying drawings of a preferred embodiment in which:

Fig. 1 is a vertical sectional view taken longitudinally of a portion of a sewing machine and showing my invention as applied thereto,

Fig. 2 is an enlarged end elevational view of the work-supporting post and the bed with the work-support cover plates removed and with the machine frame shown partly in vertical section taken substantially along line 2—2 of Fig. 1,

Fig. 3 is an enlarged cross-sectional view of the feed wheel taken substantially along line 3—3 of Fig. 2.

Since this invention relates only to a feed wheel and its arrangement in a sewing machine, the drawings illustrate only a portion of the sewing machine including the work-supporting post in which the feed wheel is mounted together with the roller presser and the needle. The complete machine in which the feed wheel of this invention has been embodied is disclosed in my copending U. S. application Serial No. 217,937, filed March 28, 1951, now Patent No. 2,678,010, dated May 11, 1954, to which reference may be had as to those portions of the sewing machine which are not disclosed herein.

Referring to the drawings, the sewing machine comprises a frame including a bed **10**, a two-part work-support including a feed wheel supporting post **11** and a hook supporting post **11'** each formed with flanges **12** and **12'**, respectively, which are secured to the bed by screws **13**, and a sewing head **14** supported in spaced relation with the work-supporting post in a manner well known in the art.

The upper extremity of the posts **11** and **11'** are closed by a work-supporting plate **15**, a throat plate **16**, and a sheet metal cover plate **17**. A needle **18**, which is carried by a needle-bar **19** journaled in the sewing head, is reciprocated endwise by usual means, and is arranged to enter through a suitable aperture in the throat-plate. The needle cooperates in the formation of lock stitches with

a rotary hook **20** which is disposed beneath the plates **15** and **16** and is carried for rotation by a hook shaft **21** journaled vertically in bearings **22** in the post **11'**.

Beneath the posts **11** and **11'**, the bed **10** is provided with a compartment **23** formed by depending walls **24** and a bottom closure plate **25**. The hook shaft **21** depends into the compartment **23** and is there provided with a gear connection **26** to a bed-shaft **27**. It will be understood that the bedshaft and the needle reciprocating means are operatively connected for actuation in timed relation to insure proper cooperation between the needle and the rotary hook.

The work-feeding mechanism shown in the drawings comprises a pair of wheels **30** and **31** which are opposed in work-engaging relation adjacent to the path of the needle. The wheel **30**, which is termed a feed wheel, is journaled on an axis disposed within the post **11** and is arranged to extend through a suitable slot **32** in the throat-plate **16**. The wheel **31** is a driven roller presser, and is carried by a shank **33** fast on a presser bar which is slidably journaled in the sewing head **14** and spring biased downwardly to urge the roller presser into opposition to the feed wheel.

Step-by-step rotary motion is imparted to both the feed wheel **30** and the roller presser **31** from the bed-shaft **27** by means of a clutch **35** which is carried on a shaft **36** journaled vertically between the flange **12** of the work supporting post and the bottom closure plate **25** of the compartment **23**. The clutch **35** is of the type adapted to impart motion in only one direction of rotation to the shaft **36**. This clutch may be identical with that disclosed in the U. S. patent of Hacklander No. 2,277,971 and reference is made to that patent for a complete description of it. It is sufficient for comprehension of the present invention to understand that oscillatory motion is imparted to the clutch **35** by means of an eccentric **37** fast on the rotary bed-shaft **27**, a pitman **38**, and a clutch actuating arm **39**, and that of this oscillatory motion, only motion in one direction is imparted to the shaft **36**.

The step-by-step rotary motion of the shaft **36** is transmitted to the roller presser **31** from a pulley **40** on the shaft **36** by means of drive belts **41** and **42** and suitable operative connections between the belts as is shown and described more completely in my above mentioned prior U. S. application Serial No. 217,937. The motion of shaft **36** is transmitted to the feed wheel **30** by means of a vertically arranged feed drive shaft **43** which is rotatably journaled in an elongated bushing **44** which is fixed, as by a set screw **45**, in a lug **45'** in the work-supporting post **11**. A bevel gear or pinion **46** fast on the upper extremity of the feed drive shaft **43** is arranged in mesh with a bevel gear **47** to which the feed wheel **30** is fixed for rotation as by screws **48**. As will now be described, the bevel gear **47** is journaled for rotation on a bracket member **49** which is formed with a split collar **50** embracing the bushing **44** and provided with a bolt **51** by which the collar may be clamped in selected position along the bushing.

Referring particularly to Fig. 3, the bevel gear **47** has an axial bore **52** which is formed at each side with a counterbore **53** and **54** to provide spaced outer raceways for two rows of ball bearings **55**. The inner bearing raceway complemental or opposed to the counterbore **53** is provided by means of a member **56** formed with a conical periphery **57** on which the ball bearings **55** are adapted to roll. The inner raceway member **56** is formed with a threaded axial bore **58** and a counterbore **59** disposed to embrace a locating boss **60** which projects from the bracket member **49**. Member **56** is restrained from rotation by means of a locking pin **61** which projects from the bracket member. The inner raceway complemental or opposed to the counterbore **54** in the bevel gear **47** is

provided by a member 62 formed with a conical periphery 63 on which the ball bearings 55 are adapted to roll. Member 62 is formed with an axial stud 64 which is threaded into the bore 58 of the inner raceway member 56. The threaded connection between the inner raceway members 56 and 62 provides a means for attaining a fine adjustment of the clearance between the respective inner and outer raceways. To facilitate this adjustment, the inner raceway member 62 is formed with a transverse slot 65 to accommodate a spanner-wrench. The inner raceway member 62 is also formed with an axial bore 66 to accommodate a lock bolt 67 which is threaded into the boss 60 of the bracket-arm 49. When the proper adjustment of the inner raceway members has been made, tightening of the lock bolt 67 serves to bind the threaded connection between the inner raceway members and thus to lock the parts in the selected position of adjustment.

Should wear or the above described adjustment of the bearing raceways disturb the meshing relation between the bevel gears 46 and 47, this relationship between the gears may be adjusted without disturbing the nice adjustment of the bearing raceways by loosening the bolt 51 of the bracket member split collar 50 and relocating the bracket member along the bushing 44 until proper meshing relation of the gears 46 and 47 is reestablished.

A critical adjustment of the feed wheel concerns its elevation with respect to the throat plate 16. Relocation of the bracket member 49 properly to mesh gears 46 and 47 will, of course, change the amount by which the feed wheel protrudes above the throat plate. Proper elevation of the feed wheel may be obtained without disturbing the meshing relation of the bevel gears 46 and 47 by loosening the set screw 45 and adjusting the vertical position of the bushing 44. Since the bushing is fitted snugly against the hub of bevel gear 46 at one extremity and at the other extremity against a collar 68 fast on the feed drive shaft, adjustment of the position of the bushing will effect a bodily adjustment of the feed drive shaft; the bevel gear 46 and the bracket member 49 with the feed wheel 30. In order to accommodate such vertical adjustment of the feed drive shaft 43 with respect to the clutch shaft 36 as well as to accommodate any slight misalignment which may occur between these two shafts, an extensible telescopic connection is provided therebetween. To this end, the collar 68 is formed with an axial counterbore 69 of which the side walls are formed with diametrically opposed slots 70—70. The upper extremity of the clutch shaft 36 is formed with a spherical enlargement 71 which is disposed within the counterbore 69. A pin 72, which is fitted transversely of the shaft 36 and is secured by a set screw 73 in the spherical enlargement 71, extends at each side through the slots 70—70 in the collar 68 to rotationally interlock the shafts 36 and 43.

Thus, with the above described arrangement, any of the adjustments which are essential to proper operation of the feed wheel may be readily and conveniently made. Moreover, this invention provides for a systematic and complete adjustment of the feed wheel mechanism including a micrometer adjustment of the feed wheel bearing raceways, a nice adjustment of the meshing relation of the bevel gears which drive the feed wheel, and an adjustment of the feed wheel elevation.

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

1. A work-feeding wheel for a sewing machine having a work-engaging peripheral portion and a body portion, said body portion being formed with an axial bore, axially spaced outer bearing raceways formed in said bore, a pair of inner bearing race members each disposed complemental to a respective one of said outer bearing raceways, a feed-wheel supporting bracket, means supporting a first of said inner bearing race members on said bracket, means preventing rotation of said first inner bearing race member with respect to said bracket, a threaded connection between said inner bearing race members providing relative axial adjustment therebetween, and means for clamping the second of said inner bearing race members to said bracket to cause binding of said threaded connection.

2. A work-feeding wheel for a sewing machine having a work-engaging peripheral portion and a body portion, said body portion being formed with an axial bore, axially spaced outer bearing raceways formed in said bore, a pair of inner bearing race members each disposed complemental to a respective one of said outer bearing raceways, a feed-wheel supporting bracket, a boss projecting from said bracket, a first one of said inner race members being formed with an axial bore, said bore being shaped at one extremity to embrace said boss and being formed at the opposite extremity with internal threads, means preventing rotation of said first inner race member with respect to said boss, an externally threaded portion formed on a second of said inner race members and arranged in mating relation with the threads of said first inner race member, means for turning said second inner race member, and means for clamping the second inner race member to said bracket-arm to cause binding of said threaded connection.

3. In a sewing machine having a frame including a work-supporting plate, a work-feeding mechanism comprising a shaft-bushing carried within said frame, a shaft journaled in said bushing, a bracket member carried by said bushing, a pinion carried by said shaft, a gear carried by said bracket member, a work-feeding wheel carried by said gear and disposed to project through said work-supporting plate, antifriction bearing means between said gear and said bracket member comprising spaced outer raceways for two rows of antifriction bearing elements formed in said gear, a pair of inner race members disposed to cooperate each with a respective one of said outer raceways, means for locating a first one of said inner race members in fixed position with respect to said bracket member, means for locking the second of said inner race members to said bracket member in selected axial relation with respect to said first inner race member, and means for locking said bracket member in selected position along said bushing to establish operative meshing relation between said pinion and said gear.

4. In a sewing machine work-feeding device as set forth in claim 3, means slidably supporting said shaft-bushing in said frame for movement toward and away from said work-supporting plate, and means for locking said bushing in selected position with respect to said frame to establish the extent to which said feed wheel projects through said work-supporting plate.

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