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FEED DOG AND THROAT PLATE FOR COMPOUND FEED SEWING MACHINES

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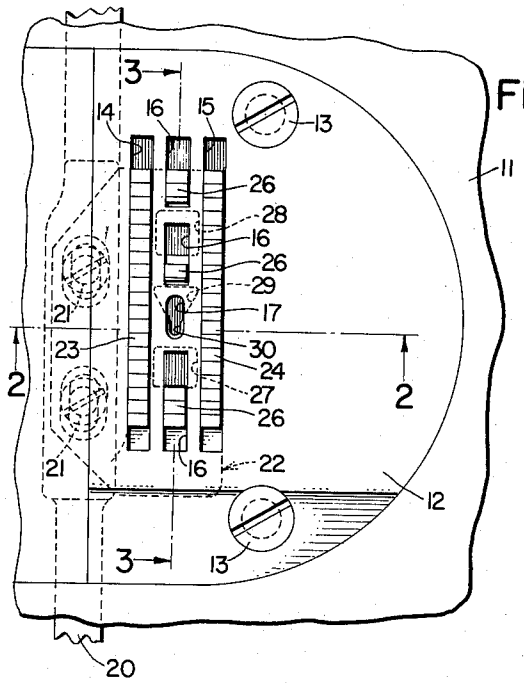


Fig. 1.

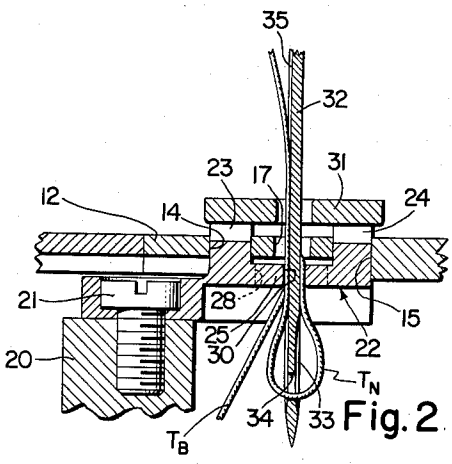


Fig. 2.

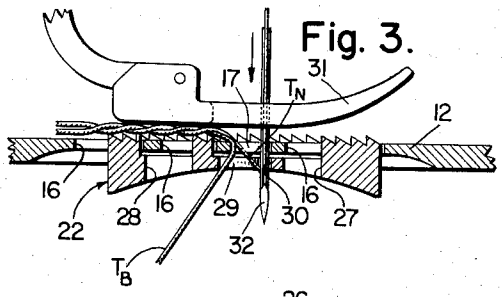


Fig. 3.

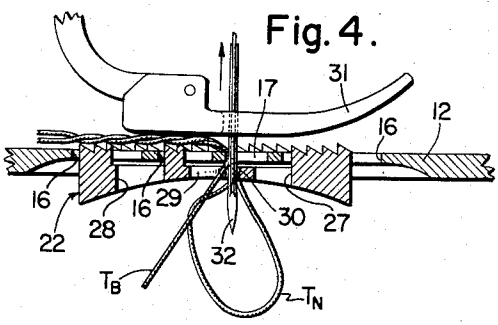


Fig. 4.

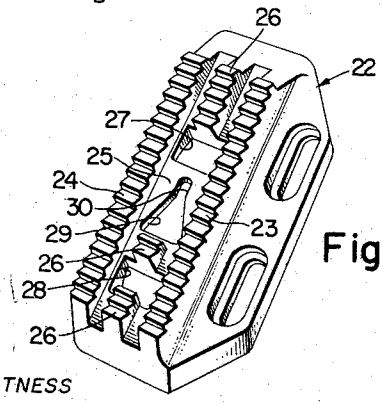


Fig. 5.

WITNESS

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FEED DOG AND THROAT PLATE FOR COMPOUND FEED SEWING MACHINES

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This invention relates to sewing machines having compound work feeding mechanisms, that is, a mechanism in which the needle moves in the line of feed in synchronism with the feed dog and the feeding occurs while the needle is in the goods. More particularly, this invention relates to a novel and improved feed dog and throat plate combination for compound feed sewing machines.

It is an object of this invention to provide a feed dog and throat plate combination for a compound feed sewing machine which is highly effective in chaining off, i.e., in influencing proper thread concatenation when there is no longer any work fabrics beneath the sewing machine presser foot.

Another object of this invention is to provide a feed dog and throat plate combination for a compound feed sewing machine in which the work fabrics being stitched are manipulated in a novel and effective manner to prevent flagging of the work during the setting of stitches therein.

It is also an object of this invention to provide a feed dog and throat plate combination in which the feed dog is provided with a platform beneath the throat plate and with a novel and effective means for preventing the accumulation of lint on the feed dog platform.

With the above 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 represents a top plan view of a sewing machine cloth plate having a throat plate and a feed dog applied thereto in accordance with this invention,

FIG. 2 is an enlarged cross sectional view taken substantially along line 2—2 of FIG. 1 and including a portion of the sewing machine needle and the sewing threads,

FIG. 3 is a cross sectional view taken substantially along line 3—3 of FIG. 1 and including the sewing machine presser foot, needle, and the sewing thread with the needle and feed dog illustrated at the beginning of needle penetration and at the start of the work feeding motion,

FIG. 4 is a cross sectional view taken substantially along line 3—3 of FIG. 1 similar to FIG. 3 but with the parts illustrated upon withdrawal of the needle and at the conclusion of the work feeding motion, and

FIG. 5 represents a perspective view of the feed dog of this invention.

Referring to the drawing, a fragment of the work supporting cloth plate of a sewing machine is illustrated at 11 and, as shown in FIG. 1, the cloth plate is fitted with a throat plate 12 secured by screws 13. The throat plate 12 is formed with spaced rectangular feed dog accommodating slots 14 and 15 one at each side of and parallel to a row of aligned elongate feed dog accommodating slots 16. Also formed in the throat plate between the feed dog accommodating slots 14 and 15 is an elongate needle aperture 17.

Carried beneath the cloth plate 11 and the throat plate 12 is a feed bar 20 to which is secured by screws 21 a feed dog 22. The feed dog is formed with continuous parallel raised ribs 23 and 24 provided with work engaging serrations and adapted to operate upwardly

through the feed dog accommodating slots 14 and 15 in the throat plate, as illustrated in FIGS. 1 and 2. Between the feed dog ribs 23 and 24 extends a web 25 formed with a row of aligned raised lands 26 each provided with work engaging serrations and adapted to operate upwardly through the feed dog accommodating slots 16 in the throat plate. The web 25 of the feed dog is formed with two rectangular apertures 27 and 28 disposed between the lands 26 and extending substantially the entire width of the web 25 between the continuous raised work engaging ribs 23 and 24 for the purpose of clearing lint from between the web 25 and the throat plate as will be explained hereinbelow. The web 25 is also formed with a generally triangular aperture 29 of which one side edge extends substantially the entire width of the web 25 between the continuous raised work engaging ribs 23 and 24 and is perpendicular to the direction of feed. From the apex of the other two side edges of the triangular aperture 29 and beneath the needle aperture 17 in the throat plate extends a narrow needle accommodating slot 30 for the purpose of controlling the needle thread during sewing.

FIGS. 2, 3 and 4 illustrate a presser foot 31 which is biased downwardly against the throat plate and in opposition to the feed dog. These figures also illustrate a needle 32 formed with a short groove 33 at one side of the needle eye 34 and with a long groove 35 at the opposite side of the eye. In addition, FIGS. 2, 3 and 4 include a representation of the sewing threads during a chaining-off operation in which no work is present between the presser foot and the throat plate. The thread from a conventional bobbin is indicated as T_b while the needle thread is indicated as T_n.

The sewing machine to which this invention has application is of the variety known in the art as a compound feed machine in which there is imparted to the needle, in addition to endwise reciprocation, movements in the direction of feed. The mechanism for imparting such endwise and work feeding motions to the needle may be of any known form. The feed dog 22 partakes of conventional four motion movements, that is, upwardly into engagement with the work, then a forward work feeding motion, downwardly out of engagement with the work, followed by a return motion. Any known four motion feed actuating mechanism may be used provided the actuating mechanism be timed to impart the forward work feeding motion during work penetration of the needle such that the feed motions of the needle and the feed dog act in concert to advance the work.

While compound feed sewing machines are well known in the art and the primary advantage is well recognized in that a plurality of plies of work fabrics may be advanced far more evenly and without gathering of one of the plies than with work feeds located solely on one side of the work, compound feed sewing machines have been troublesome for several reasons, and this invention is directed to means for obviating these disadvantages of known compound feed machines.

The compound feed sewing machines known in the art have exhibited poor chaining-off characteristics. It is extremely troublesome when a sewing machine fails to concatenate the sewing threads properly as a work fabric passes from beneath the presser foot. Such an operation is known in the art as chaining-off, and it is a serious and time consuming problem if a sewing machine snarls and breaks the sewing threads as the operator proceeds from one garment to the next.

To explain the chaining-off difficulties heretofore experienced with compound feed machines it must first be understood that sewing machine needles are formed from the eye with a short groove 33 on that side from which the needle thread extends to the work and with a long

groove 35 on that side of the eye from which the needle thread extends to the supply spool. In order properly to present a loop of needle thread between the needle eye and the work for seizure and manipulation by the stitch forming instrumentalities, such as a conventional loop taker, it is necessary that some resistance be offered to the work limb of the thread extending from the eye of the needle to the work as the needle begins to rise so that this limb of the thread will not move vertically with the needle but will be stripped off the needle and bowed outwardly to form a loop. When there are work fabrics beneath the presser foot for penetration by the needle, the work fabrics in hugging the needle provide such resistance or thread stripping action. Because of the absence of a long groove on that side of the needle from which the thread extends to the work, the resistance offered this limb of thread is greater than that on the long groove side where the thread is buried in the groove and thus loop formation on the short groove side of the needle is encouraged. When the needle does not penetrate work fabrics, the resistance on the thread to encourage loop formation must be derived elsewhere. In sewing machines in which the needle partakes of only endwise reciprocation the throat plate needle aperture can be sufficiently small to provide the necessary resistance for loop formation, however, in a compound feed machine the needle during loop formation is being moved along the necessarily elongated needle aperture 17 in the throat plate and the thread will be wiped to one side of the needle rather than remaining constricted between the needle and one side of the needle aperture.

In the present invention, the narrow needle accommodating slot 30 of the triangular opening 29 of the feed dog provides for the resistance of the work limb of the thread on the needle to encourage proper loop formation when there is no work beneath the presser foot. Since the needle and feed dog move in synchronism in feeding the work there is no relative lateral motion between the needle and the feed dog slot 30 and, therefore, the same desirable cooperation between these parts for loop formation in chaining-off occurs as in machines in which the needle is not used in the feed of the work.

It is important to note that in the arrangement of this invention, the narrow needle accommodating slot 30 of the aperture 29 is formed in the feed dog web portion 25 which underlies the throat plate 12. This construction differs from that of a known feed dog construction for compound feed machines in which a needle aperture in the feed dog is formed in a portion of the feed dog which is raised substantially to the level of the tops of the serrated work engaging teeth thereof. In this known construction, the throat plate is cut away to provide clearance for the raised apertured feed dog portion rather than being sandwiched between the work and the apertured feed dog portion as in the construction of the invention. The prior construction has a deleterious effect upon the quality of stitch formation because, in a compound feed sewing machine, the stitches are set after the needle has been raised out of the work and during the lowered return stroke of the feed dog. Thus with the prior construction, the work in the immediate vicinity of the stitching point is freed during stitch setting and a condition referred to as flagging is common; that is, the tension applied to the sewing threads in setting the stitch causes the work which is held only about the marginal edges of the presser foot to move upwardly or downwardly, thus adversely influencing the tension at which successive stitches are set into the work.

With the construction of this machine in which the throat plate is sandwiched between the apertured web 25 of the feed dog and the work, the presser foot during stitch setting, and while the feed dog is lowered, clamps the work about the needle aperture 17 in the throat plate and closely adjacent to the stitching point such that flagging is definitely minimized.

It will be appreciated that the accumulation of lint on the web 25 is to be avoided so as not to interfere with the motion of the feed dog beneath the throat plate. The apertures 27, 28 and 29 in the web 25 provide a simple and effective means for discouraging the collection of lint, thread, and the like on the web, and for clearing any such foreign material from between the feed dog and throat plate. The edges of the apertures 27, 28 and 29 are preferably angular, as illustrated in FIGS. 2, 3 and 4, and serve during the regular motions of the feed dog to scrape any lint or the like which may find its way on the web 25 into one of the apertures through which the foreign matter will fall harmlessly beneath the machine.

The feed dog and throat plate combination of this invention thus provide the advantages in a compound feed sewing machine of highly effective chaining-off operation during periods while no work is disposed beneath the presser foot, the elimination of work flagging during stitch setting and the consequent high uniformity of stitch setting and satisfactory seam appearance, and the effective removal of lint or other foreign material from between the throat plate and the feed dog.

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

1. In a compound feed sewing machine, a throat plate having a portion formed with a needle aperture elongate in the direction of feed substantially the length of the longest stitch adapted to be produced by said sewing machine and with parallel feed dog slots elongate in the direction of feed and disposed one at each side of said needle aperture, a feed dog, upstanding work engaging ribs formed on said feed dog and operable upwardly through said feed dog slots in the throat plate, a web portion of said feed dog extending between said work engaging ribs and disposed beneath that portion of said throat plate formed with said needle aperture, said feed dog web being formed with a lint clearing aperture extending substantially the entire width of said web between said work engaging ribs, and said feed dog web being provided with a needle accommodating aperture formed as a narrow slot extending from said lint clearing aperture and disposed beneath said needle aperture in said throat plate.

2. A device as set forth in claim 1 in which said lint clearing aperture is of substantially triangular shape having one side edge disposed transversely across said web substantially perpendicular to the direction of feed, and in which said needle accommodating aperture in said web extends from said triangularly shaped lint clearing aperture at the apex formed by the juncture of the other two sides thereof.

3. A feed dog and throat plate combination adapted for a compound feed sewing machine, comprising a throat plate formed with a needle aperture elongate in the direction of feed, with parallel continuous feed dog slots elongate in the direction of feed and disposed one at each side of said needle aperture, and with a row of aligned elongate feed dog slots parallel to and between said continuous feed slots being and arranged at least one beyond each end of said elongate needle aperture, a feed dog, continuous upstanding work engaging ribs formed one at each side of said feed dog and operable upwardly through said continuous feed dog slots in the throat plate, a web portion of said feed dog extending between said continuous upstanding work engaging ribs and disposed beneath said throat plate, a plurality of raised upstanding work engaging lands formed on said web and operable upwardly each through one of said row of aligned feed dog slots in said throat plate, said feed dog web being formed with a plurality of lint clearing apertures extending substantially the entire width of said web between said continuous upstanding work engaging ribs and between said plurality of raised upstanding work engaging lands, and said feed dog web being provided with a needle accommodating aperture formed as a narrow slot elongate

in the direction of feed extending from one of said lint clearing apertures and disposed beneath said needle aperture in said throat plate.

4. A device as set forth in claim 1 in which said feed dog web is provided with a plurality of lint clearing apertures each extending substantially the entire width of said web between said work engaging ribs, and with said needle accommodating aperture formed as a narrow slot extending from one of said plurality of lint clearing apertures.

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