Sept. 1, 1925. 1,551,671

F. J. KAUFMANN

DEVICE FOR ASCERTAINING INACCURACIES IN STUD WHEELS

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Fig. 1.

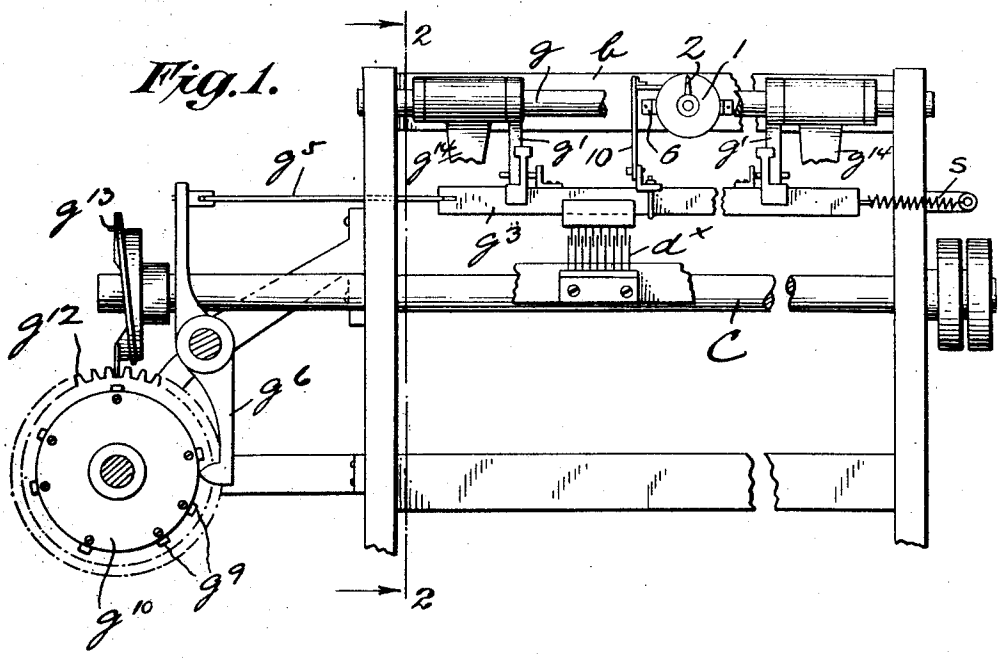
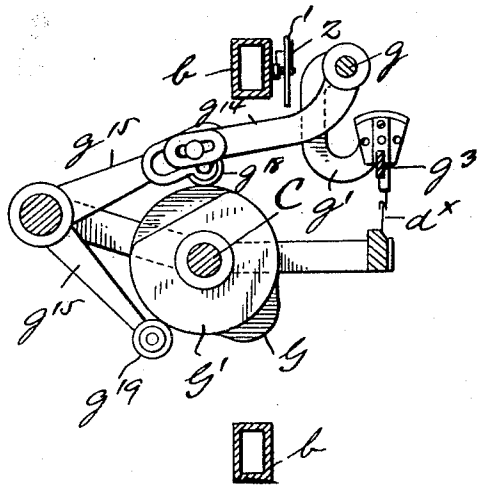


Fig. 2.



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Fig. 3.

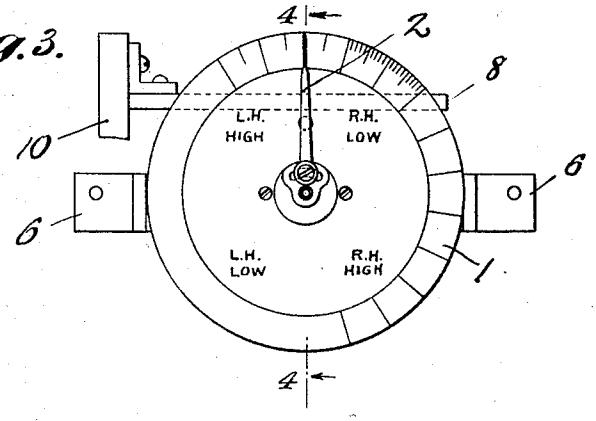


Fig. 4.

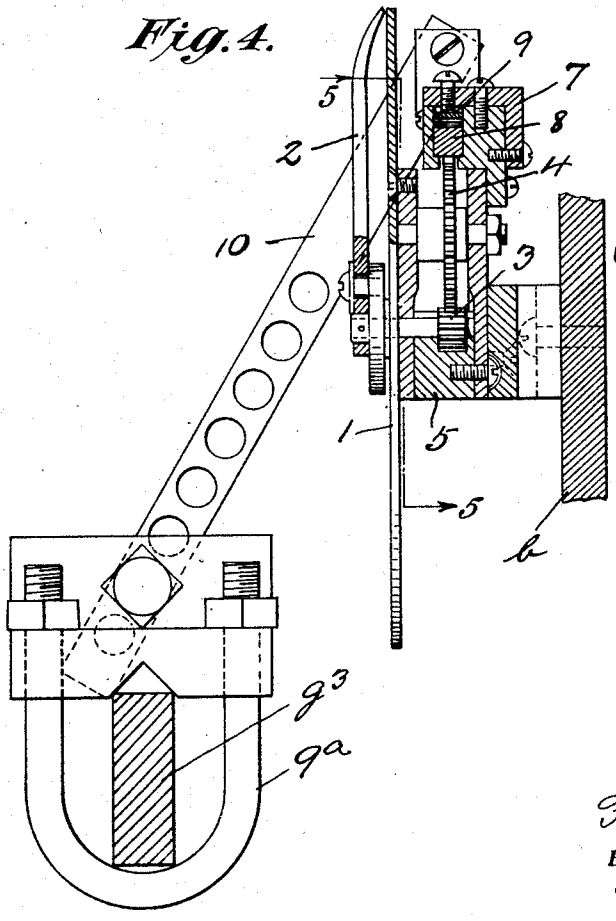
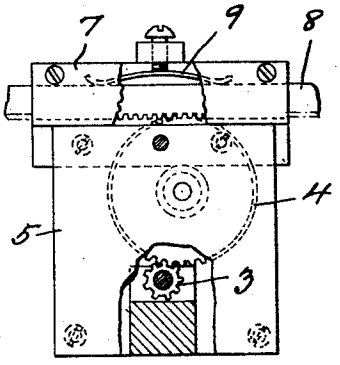


Fig. 5.



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Patented Sept. 1, 1925. 1,551,671

UNITED STATES PATENT OFFICE.

FRANK J. KAUFMANN, OF TRIBES HILL, NEW YORK.

DEVICE FOR ASCERTAINING INACCURACIES IN STUD WHEELS.

Application filed February 6, 1922. Serial No. 534,490.

To all whom it may concern:

Be it known that I, FRANK J. KAUFMANN, a citizen of the United States, and a resident of Tribes Hill, in the county of Montgomery and State of New York, have invented a certain new and useful Device for Ascertaining Inaccuracies in Stud Wheels, of which the following is a specification.

This invention relates to warp knitting machines such as are disclosed in United States Letters Patent Nos. 397,140; 1,297,424 and 1,299,754 and has more particularly reference to means for ascertaining inaccuracies in the cam or stud wheels that impart reciprocating motion to the guide bar or bars.

In machines of this character, the guide bars have a reciprocating movement in one plane and an oscillating movement in another plane at right angles to the first one, the operation in general, so far as these elements are concerned, being that the guide bars partake of one stroke of their reciprocating movement, then rock through the spaces between the needles to the other side of the latter, then receive the return stroke of their reciprocating motion, and then rock back through the spaces between the needles. It will be evident that, unless the guide bars, when they come to the end of each stroke of their reciprocating movement, register accurately with the needle spacing, variation and interference will develop between the needles and guide bars when the latter are rocked through the needle spaces. The means employed to effect the reciprocating movement of the guide bar consists of a cam wheel, generally known as a stud wheel, and a spring, and thus the accuracy of the registration of the guide bar with respect to the needles depends upon the accuracy of the high and low surfaces of the cam-wheel. In time, these cam wheels become worn thereby causing the variation and interference above described and thereby also adversely affecting the quality of the goods being manufactured. Since each cam wheel has a number of "studs" or high points and a similar number of low points, it becomes necessary to put the machine through its entire cycle of operation, usually a number of times, before the mechanic can properly locate the worn or inaccurate spot and when located it is then necessary to judge haphazardly by the eye of the mechanic the amount of discrepancy existing in the cam wheel. Thereafter an approximate correction is made either by filing down or building up surfaces, by screw adjustment or otherwise. If the adjustment made is not accurate the whole thing may have to be done over. It will be appreciated that this work is extremely tedious, uncertain and difficult and requires an extraordinary amount of care and skill on the part of the mechanic.

The main object of this invention is to render inaccuracies in the cam wheel more easily and certainly ascertainable and to determine more accurately the amount of discrepancy to be corrected, and the invention consists of the apparatus hereinafter described, here shown in a preferred form.

In the drawings:

Fig. 1 is a fragmentary view of so much of the machine disclosed in Patent No. 397,140 as is necessary to understand the invention, with the device of my invention shown in position.

Fig. 2 is a sectional view on the plane of line 2—2 of Fig. 1.

Fig. 3 is an enlarged face view of the dial, pointer and rack used in connection with the invention.

Fig. 4 is a sectional view on the plane of line 4—4 of Fig. 3 showing also the means for clamping the rack to the guide bar.

Fig. 5 is a sectional view on the plane of line 5—5 of Fig. 4, with parts broken away and in section.

g^{10} indicates a stud or cam wheel of which there may be several, one for each guide bar, motion being imparted to said wheel in a suitable manner, as from shaft C by means of gears g^{13} and g^{12}. The stud wheel is provided with a number of studs g^9, a few only being shown. g^6 is a pivoted lever, the lower end of which is actuated by the studs and the upper end of which is connected by rod g^5 with guide bar g^3 which latter is mounted to reciprocate. Each time the lower end of lever g^6 encounters a stud, the guide bar is moved to the left in Fig. 1 and spring s causes return movement to the right in Fig. 1 as far as the low surfaces of the cam or stud wheel will permit. The guide bar is carried by arms g^1 mounted on guide bar rockshaft g and a rocking movement is imparted to said rockshaft and therefore to the guide bar by suitable means such as cams G and G′ acting on rollers g^{18} and g^{19}, the motion of which is trans-

mitted through bell crank g^{15} and link g^{14} to said rockshaft.

1 indicates a dial and 2 is a pointer moving over it, there being a pinion 3 on the spindle of said pointer in mesh with gear 4. These elements are carried by a bracket 5 having lugs 6 suitably attached to some stationary part of the machine, such as the longitudinal braces *b*. Bracket 5 also carries a guide 7 in which slides a rack 8 in mesh with gear 4 and held in engagement therewith by means of spring 9. Rack 8 is actuated by the stud or cam wheel,—that is, each time a stud encounters the end of lever g^6 and each time a stud allows lever g^6 to drop back under the influence of spring *s*, a movement in one direction or the other is imparted to rack 8. This movement may conveniently be effected by securing rack 8 to guide bar g^8 and this may be done by any suitable means such as clamp 9^a and adjustable connection 10.

In machines using twenty-eight needles to the inch, the distance between two needles from center to center is .035714 and considering a group of twenty-two of such needles we find that the product of .035714 times 22 is .785708. The circular pitch of a 36 diametral pitch gear or pinion is .0873 and considering a pinion having nine teeth we find that the product of .0873 times 9 is .7857. Disregarding the infinitesimal decimal of .000008 we therefore find that a certain multiple of the center distance between two needles and the product of the circular pitch times the number of teeth of a certain pinion represent substantially the same distance measurement, viz. .7857 and that these elements therefore can be coordinated for measuring purposes.

It will now be understood that dial 1 is a graph on which is plotted in circumferential relation a multiple, here twenty-two, of the center distance between two needles as d^x and that pinion 3 is of such circular pitch and has such number of teeth, here nine—that one revolution of said pinion represents the same measurement as the twenty-two needles. This is only by way of example as it will be understood that if the needle spacing were different a different gear and a different multiple of needles might have to be used.

From the foregoing, it follows that upon movement of the guide bar in one direction, pinion 3 will turn a carrying pointer 2 with it, a complete revolution of the pinion being equal to a group of twenty-two needles d^x. Dial 1 is therefore provided with twenty-two divisions, and, in addition, with requisite subdivisions; and in this manner the particular part of the cam wheel that is defective can be ascertained and the amount of the discrepancy can be measured accurately by the subdivisions of the dial.

If the stud wheel is solid, the test of the apparatus is started by finding the lug having the lowest height the indicator being set at zero. On a stud wheel with individually adjustable lugs, the testing process may be started with any lug, the indicator being at zero, and any discrepancy shown by the other lugs corrected by raising or lowering said lugs an amount equal to the discrepancy.

This invention is applicable not only to warp knitting machines but to any machines in which two groups of comb-like members pass between each other and in which inaccuracies in the actuating means for determining the relative position of said groups may occur.

It will be understood that the invention is in the nature of an attachment to the machine and is removed when the machine is running.

I claim:

1. A device for indicating inaccuracies in cam wheels that effect reciprocation of guide bars with respect to needles in knitting machines comprising a pinion, the product of the circular pitch times the number of teeth of said pinion being substantially equal to a multiple of the center distance between two needles and driving connections between the cam wheel, actuated by cam action thereof, and the pinion.

2. A device for indicating inaccuracies in cam wheels that effect reciprocation of guide bars with respect to needles in knitting machines comprising: a pinion, the product of the circular pitch times the number of teeth of said pinion being substantially equal to a multiple of the center distance between two needles, driving connections between the cam wheel, actuated by cam action thereof, and the pinion, a dial having a number of divisions equal to said multiple of the center distance between two needles, and a pointer associated with said dial and actuated by the pinion.

3. A device for indicating inaccuracies in cam wheels that effect reciprocation of guide bars with respect to needles in knitting machines comprising: a rack, connections between the rack and a guide bar, and a pinion driven by the rack, the product of the circular pitch times the number of teeth of the pinion being substantially equal to a multiple of the center distance between two needles.

4. A device for indicating inaccuracies in cam wheels that effect reciprocation of guide bars with respect to needles in knitting machines comprising: a rack, connections between the rack and a guide bar, a pinion driven by the rack, the product of the circular pitch times the number of teeth of the pinion being substantially equal to a multiple of the center distance between two

needles, a dial having divisions indicating said multiple of the center distance between two needles, and a pointer actuated by said pinion and passing over said dial.

5. A device for indicating inaccuracies in cam wheels that effect reciprocation of guide bars with respect to needles in knitting machines comprising: a pinion, driving connections between the cam wheel, actuated by cam action thereof, and the pinion, the product of the circular pitch times the number of teeth of said pinion being substantially equal to a multiple of the center distance between two needles, a dial having divisions indicating said multiple of the center distance between two needles, and a pointer actuated by said pinion and passing over said dial.

6. A device for indicating inaccuracies in cam wheels that effect reciprocation of guide bars with respect to needles in knitting machines comprising: a rack, connections between the rack and a guide bar, a pinion driven by the rack, a dial, and a pointer actuated by said pinion and passing over said dial.

7. A device for indicating inaccuracies in actuating means that determine the relative position of two groups of comb-like members that pass between each other comprising: a pinion, driving connections from said actuating means to said pinion, the product of the circular pitch times the number of teeth of said pinion being substantially equal to a multiple of the center distance between two members of one of said groups.

8. A device for indicating inaccuracies in actuating means that determine the relative position of two groups of comb-like members that pass between each other comprising: a pinion, driving connections from said actuating means to said pinion, the product of the circular pitch times the number of teeth of said pinion being substantially equal to a multiple of the center distance between two members of one of said groups, a dial having a number of divisions equal to said multiple of the center distance between two members, and a pointer associated with said dial and actuated by the pinion.

Signed at Amsterdam, in the county of Montgomery and State of New York, this 2d day of February, 1922.

FRANK J. KAUFMANN.