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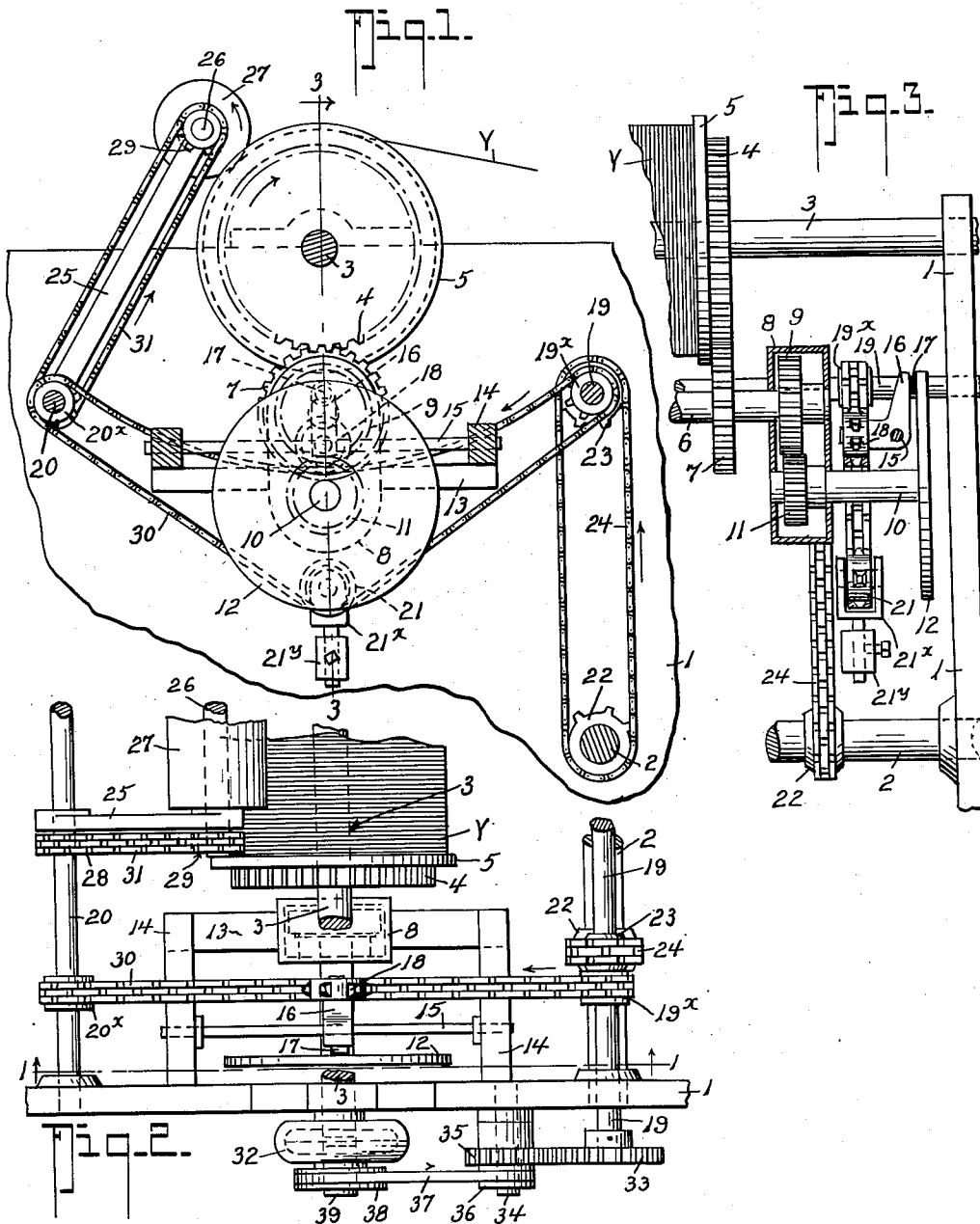
M. E. BLAKE ET AL

2,476,274

YARN FEED AND CONTROL MECHANISM

Filed May 6, 1946

3 Sheets-Sheet 1

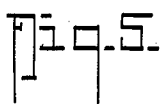


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YARN FEED AND CONTROL MECHANISM

3 Sheets-Sheet 2



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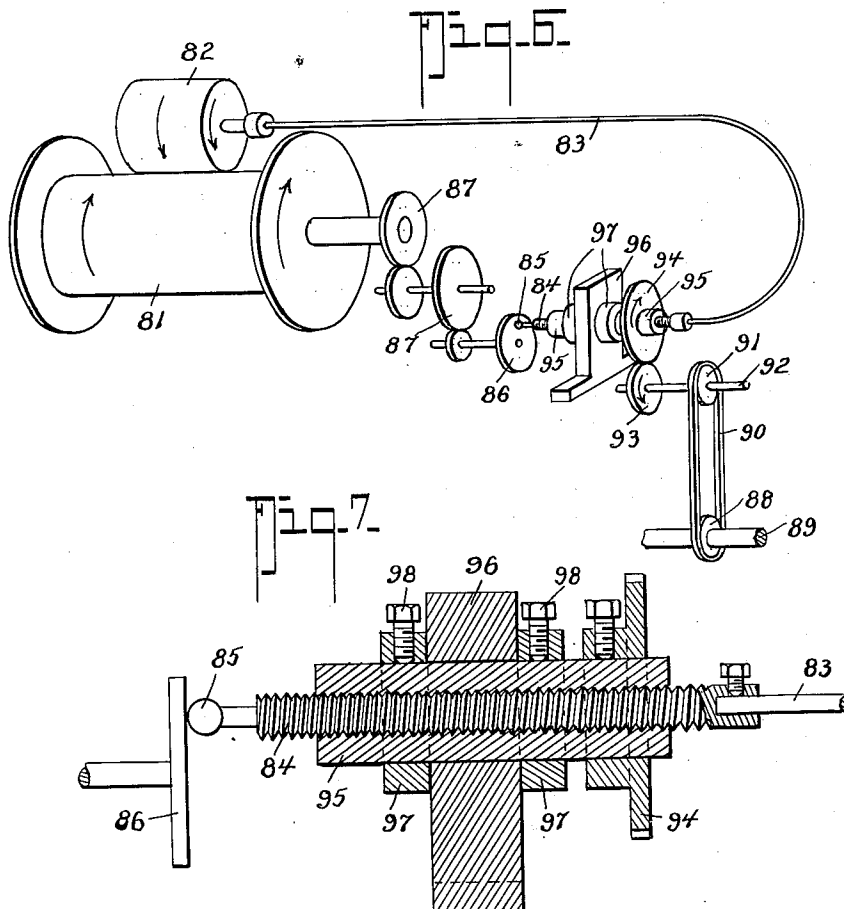
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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YARN FEED AND CONTROL MECHANISM

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The present invention relates to devices and mechanisms for controlling the amount of yarn permitted to feed off or be fed off a bobbin, or spool, or system of bobbins or spools.

Primarily the invention seeks to provide a mechanism of a simple, inexpensive construction which will effectively operate to feed or let off exact amounts of yarn per cycle, cycles or fraction of a cycle of the machine using the yarn, such as a knitting machine or weaving machine, thus greatly improving the quality of the machine's product.

Other objects will in part be obvious and in part be pointed out hereinafter.

To the attainment of the aforesaid objects and ends the invention further resides in the novel details of construction, combinations and arrangements of parts all of which will be first fully described hereinafter and then be specifically pointed out in the appended claims, reference being had to the accompanying drawings in which:

Fig. 1 is a vertical section of a portion of a machine embodying the invention taken on the line 1—1 of Fig. 2.

Fig. 2 is a top plan view of the portion of the machine, in part shown in Fig. 1.

Fig. 3 is a vertical section on the line 3—3 of Fig. 1.

Fig. 4 is a detail vertical section and elevation similar to Fig. 1 but showing another embodiment of the invention.

Fig. 5 is an enlarged detail section of a gear box that may be used with either the embodiment of the invention shown in Figs. 1 to 3 or that shown in Fig. 4.

Fig. 6 is a schematic perspective view of another embodiment of our invention.

Fig. 7 is a detailed vertical longitudinal section on a larger scale of a portion of the embodiment shown on Fig. 6.

In the drawings in which like numerals and letters of reference indicate like parts in all the figures, 1 represents the frame of a knitting or weaving machine, 2 the cam shaft of the machine and 3 the shaft for the bobbin, spool or beam, etc. 5 on which the yarn Y is wound and from which it is fed or drawn as the case may be.

In the embodiment of the invention illustrated in Figs. 1, 2 and 3, the shaft 3 is shown as provided with a gear 4 that meshes with a gear 7 on a shaft 6 extended from the gear box 8 in which is a gear train 9, 11 for connecting the shaft 6 with the shaft 10 on which the brake

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disc 12 is mounted. Any suitable support 13 may be provided for the gear box 8.

The object of doing this is to speed up disc 12 so that the brake as represented by brake shoe or pad 17 and disc 12, acting together, will be more sensitive and there will be a definite mechanical advantage over applying a brake directly to the beam or bobbin.

Although the bobbin is driven by the pull of the yarn during the knitting operation, this timing may be opposed or augmented by the drive from the cam shaft through shaft 19.

When driven by shaft 19, that shaft may be provided with a gear 33 to mesh with an idler gear 35 on a stub shaft 34 to which gear 35, a pulley 36 is attached. The clutch 32 will then include a shaft 39 and a pulley 38 over which and over pulley 36 a belt 37 passes (any other suitable drive between clutch 32 and shaft 19 may be provided if found desirable). Said drive between bobbin, spool or beam 5 and powered shaft 19 would then be a constant, predetermined speed drive unless influenced by brake shoe 17 coming into contact with brake disc 12 which would cause clutch 32 to slip.

As previously described, the gearing between cam shaft 2 and the clutch 32 is such that when the bobbin 5 is filled with yarn, the clutch must slip a considerable amount. This is arranged this way so that when the bobbin or beam is almost empty, the amount of slipping in the clutch will be a minimum, and even when the beam is completely empty, there will be a certain small capacity left in the clutch such that it will still have to slip as the yarn is being fed off. The reason for this is obvious, we assume, from a mechanical point of view and must be this way in order for the quality of cloth to be changed requiring more yarn to be fed into the machine than is actually fed under the conditions as represented by Figures 1, 2, and 3.

A driving sprocket 22 on cam shaft 2 is operatively connected to a sprocket 23 on shaft 19 by a chain 24.

Chain 30 passes over sprockets 19^x and 20^x on shafts 19 and 20 respectively. The shafts 19 and 20 are mounted in suitable bearings in the frame of the machine. The lower flight of the chain 30 carries a weight 21^x. The upper flight passes under an idler sprocket 18.

Mounted to turn freely on shaft 20 is a frame 25 that has suitable bearings for a shaft 26 on which is secured the contact roller 27 that lies on the yarn, or thread, Y, on the bobbin, spool or beam 5. Shaft 26 and 27 drive sprocket

20* on shaft 20 by means of sprockets 28 and 29 and a chain 31.

It is obvious that if the diameter of roller 27 is changed, for example made larger with a certain given speed of beam or bobbin 5, shaft 26 will rotate slower, hence driving shaft 20 slower. This in turn will make a part of chain 30 slack and release the contact point 17 with disc 12, because of the same gearing between cam shaft 2 and shaft 3 through clutch 32, the beam 5 will be rotated at a faster speed and will tend to hold this increased speed as the yarn from beam or bobbin 5 is used by the machine. If roller 27 is decreased in diameter for a given gearing between the cam shaft through shaft 19 and clutch 32 to beam or bobbin 5, the speed of shaft 26 will be increased, which will increase the speed of shaft 29, remove the slack from chain 30, and make contact point 17 drag on disc 12. This in turn will put a drag on beam or bobbin 5, which will force the disc clutch 32 to slip and a smaller amount of yarn will actually be fed into the machine.

In order to control the exact amount of yarn fed into the machine, the diameter of contact roller 27 must be predetermined and must be an exact amount. This can and must be arrived at through trial and error.

The rotation of shaft 2 is proportionate to the increments of yarn used by the machine. Roller 27, in contact with the yarn at its circumference on the bobbin, spool or beam is caused to turn when the bobbin turns due to friction between the roller and the yarn.

A brake lever 16 is carried by a shaft 15 that is suitably mounted as at 14. The lever 16 has a shoe 17 for contacting the disc 12 and it also carries a sprocket 18 that rides freely on the upper flight of an endless chain 30. Weighted idler 21 is used to keep enough slack out of chain 30 to prevent the chain from jumping teeth on sprockets 19* and 20*.

In operation, shaft 19 will turn at a speed proportionate to the speed of the machine using the yarn. Shaft 20, driven by roller 27 on yarn Y, will turn at the exact same speed as shaft 19 so long as the drive through slipping clutch 32 feeds the proper amount of yarn. A predetermined amount of slack in chain 30 causes chain 30 to sag, thus, idler 18 is in its lower position, moving brake shoe 17 away from brake disc 12.

In this position there is no slippage in clutch 32. When the drive to beam 5 is feeding more yarn than is required, shaft 20 is turned faster than shaft 19, removing the slack from chain 30. The raising of this chain will then also raise idler 18 and bring brake shoe 17 in contact with brake disc 12 which will cause clutch 32 to slip and hence feed less or no yarn.

When enough slack has been removed from chain 30, the brake shoe will again release the driving mechanism which will again feed yarn.

In Fig. 4 is shown another embodiment of the invention. In this figure 40 represents the shaft on which the bobbin, spool or beam 41 is mounted. The shaft 40 has a brake drum 42 with which a brake shoe 45 is adapted to engage.

A rock shaft 43 is journaled in suitable bearings 43* in the frame 1* of the machine and has a brake lever 44 attached to it. The shoe 45 is carried by the lever 44. A brake-operating lever 46 is suitably secured to shaft 43 and carries an idler 47 (sprocket or simple contact wheel) to ride on the upper flight of the chain 65, and an idler 49 to ride under that flight, the

idler 49 being mounted in a yoke 48 and serves to prevent idler 47 jumping from the chain, should too much slack occur.

The chain 65 passes about sprockets 52 and 53 on fixedly located shafts 50 and 51 respectively, and about a sprocket 54 on a shaft 55 that is vertically movable in a vertical slot 58 in a guide block 57. A weighted member 56 is mounted on shaft 55 to take up excess slack in chain 65.

A contact roller 59 rides on the periphery of the yarn on the bobbin, spool or beam and has its shaft 60 mounted in arms 62 that are freely pivoted on shaft 51. The shaft 51 carries a sprocket 63 about which, and a sprocket 61 on shaft 60, a chain 64 passes.

Shaft 50 also has a sprocket 66 about which, and a sprocket 70 on the output shaft 69 of the gear box 67, chain 71 passes. Within the gear box 67 is a suitable gear train connecting the input shaft 68 with the output shaft 69. Shaft 68 may be driven through gears 79, 80 from the cam shaft 78 of the machine. The gear train may be composed of simple gears 74, 75, 77 or it may include elliptic or irregular gears 72 when it is desired to make the yarn feed pulsate or simulate an intermittent feed. 73 and 76 are counter shafts.

In the operation of the embodiment of our invention shown in Figs. 4 and 5, the bobbin is driven by the pull of the yarn. As is well known where the pull of the yarn turns the bobbin some sort of brake must be used to keep the bobbin from overrunning. Should the pull on the yarn tend to cause the bobbin to turn faster at times (thus tending to produce slack in the yarn) the upper flight of the chain will tend to straighten out and thus, via sprocket 47 and lever 46, apply the brake shoe to the drum to slow up the bobbin until it rotates at such speed as to enable the slack to be taken up.

By adjusting the diameter of roller 27 (or 59) and/or the ratio of the gears in the train and/or the ratio of the sprockets, the amount of yarn fed or allowed to be fed per rotation of, or fraction of rotation of, the shaft 2 (or 78) may be determined, predetermined and/or controlled.

By thus controlling the amount of yarn fed into a machine, two or more of these measuring and controlling mechanisms may be applied to the two or more bobbins, or systems of bobbins, feeding yarn into the machine, thus providing a positive control of the ratio of yarns from the different bobbin systems, and greatly improving the quality of the machine's product.

In Figs. 6 and 7 is disclosed another embodiment of our generic invention, by reference to which it will be seen that 81 represents the bobbin, 86 represents a suitably mounted rotatable brake disc which is turned by the bobbin via a suitable gear train 87.

Rotatably mounted in a bearing 96 and held against endwise movement by collars 97 and set screws 98 is an internally threaded tubular shaft 95 in which a brake-shoe-carrying screw 84 is mounted. The screw at one end is provided with a brake shoe 85 to contact the disc 86.

A suitably mounted contact roller 82 continuously engages the yarn on the bobbin 81. The roller 82 is connected to the other end of the screw 84 by a flexible drive shaft 83.

A shaft 89, which may be the cam shaft of a knitting machine for example, is driven at a constant speed related to that of the machine to which the present invention is used (or the shaft 89 may be driven by a constant speed elec-

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tric motor arranged to be started and stopped with the starting and stopping of the knitting machine). As shown the shaft 89 carries a sprocket 88 about which and a sprocket 91 on a counter shaft 92 is placed a chain 90. The counter shaft 92 has a gear 93 which meshes with a gear 94 on the shaft 95.

When the machine, of which shaft 89 is a part, is starting the gear 94 is caused to turn in the direction indicated by the arrows thereon in Fig. 6. Threaded shaft 84 does not rotate because bobbin 81 and contact roller 82 at this instant are not in motion as yet. This situation causes the threaded shaft 84 to travel in hollow shaft 95 in a direction to pull the brake shoe 85 away from the brake disc 86, therefore, allowing it to turn and feed yarn.

When bobbin 81 is turned by the pull on the yarn in feeding, contact roller 82 turns in the direction indicated by the arrow thereon in Fig. 6, which, through the flexible shaft 95, rotates the threaded shaft 84 in a direction to drive it back into the hollow shaft 95, thus acting to put the brake back on and stop the yarn from feeding. As the machine continues to run and the gear 94 continues to be turned so as to take the brake 85 off, then the yarn will continue to feed, there finally obtaining a balance which means that the system at some pressure of the brake shoe 85 on the disc 86 permits the right amount of yarn to be fed continuously into the machine.

The ratio of the gears, sprocket and chain arrangement, as well as the diameter of the contact roller are so adjusted or co-related as to give the feed of yarn desired for each revolution, part of a revolution, or revolutions of the cam shaft 89 of the machine.

From the foregoing description taken in connection with the accompanying drawing it is thought the construction, operation and advantages of the invention will be clear to those skilled in the art.

What we claim is:

1. A yarn feed and control mechanism for textile machines which includes in combination, a bobbin on a bobbin shaft; a brake member operative connected with said bobbin shaft; a contact roller mounted for operative engagement with yarn on said bobbin; a brake shoe for engaging said brake member; a constantly rotating shaft in step with the textile machine using the yarn feeding means and control mechanism; operating connections between said brake shoe, said contact roller and said constantly rotating shaft, said last named operating connections including elements under control of said contact roller tending to oppose one another and develop and maintain such pressure of said brake shoe on said brake member as to cause a predetermined feed of the yarn from the bobbin.

2. A yarn feed and control mechanism which includes a bobbin on a bobbin shaft; a brake member operatively connected with said shaft; a brake lever with a brake shoe to engage said brake member; an endless chain; a pair of spaced apart shafts with sprockets about which said chain passes, said chain having a slack flight; a member carried by said brake lever for engaging said slack flight; means for imparting rotation in one direction to one of said shafts tending to maintain said flight slack; and means operatively connected with the other of said shafts and engaging the periphery of the yarn on said bobbin for taking up on said slack if yarn leaves said

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bobbin at a greater than a predetermined speed, thereby to apply the brake.

3. A yarn feed and control mechanism which includes a bobbin on a bobbin shaft; a brake member operatively connected with said shaft; a brake lever with a brake shoe to engage said brake member; an endless chain; a pair of spaced apart shafts with sprockets about which said chain passes, said chain having a slack flight; a member carried by said brake lever for engaging said slack flight; means for imparting rotation in one direction to one of said shafts tending to maintain said flight slack; a contact roller engaging the periphery of the yarn on said bobbin; means pivotally mounting said roller on the other of said shafts; a suitable sprocket and chain drive between said roller and said other of said shafts by virtue of which should yarn feed off said bobbin at more than a predetermined speed the rotation of said roller will cause the slack in the first mentioned chain to be taken up, more or less, to apply the brake.

4. A yarn feed and control mechanism according to claim 2 wherein means are provided for maintaining operative engagement between said brake-lever-carried member and said first mentioned chain.

5. A yarn feed and control mechanism according to claim 3 wherein means are provided for maintaining operative engagement between said brake-lever-carried member and said first mentioned chain.

6. A yarn feed and control mechanism according to claim 2 wherein the means for imparting rotation to said one of said shafts comprises a constantly rotating shaft and a power transmitting connection between said constantly rotating shaft and said one of said shafts, which power transmitting connection includes elliptic gears for purposes described.

7. A yarn feed and control mechanism according to claim 3 wherein the means for imparting rotation to said one of said shafts comprises a constantly rotating shaft having a definite operative relation to said bobbin; and means engaging said first mentioned chain for balancing the normal pressure of said member carried by said brake lever against said slack flight.

8. A yarn feed and control mechanism which includes a bobbin on a bobbin shaft; a gear on said shaft; a gear box having two shafts connected by gears in said box, one of said shafts having a gear meshing with said gear on said bobbin shaft, the other of said two shafts having a brake disc; a brake lever having a brake shoe for engaging said brake disc and having a chain-engaging element; two spaced-apart shafts having sprockets; a chain passing over said sprockets and having a sagging flight located below said chain-engaging element; means holding said flight in operative engagement with said chain-engaging element; a machine shaft rotating at a constant speed; a sprocket and chain connection between said machine shaft and one of said two spaced-apart shafts for driving the first mentioned chain in one direction; a support pivotally mounted on the other of said two spaced-apart shafts; a contact roller journaled in said support and engaging the periphery of yarn wound on said bobbin; a power transmitting connection between said contact roller and said other of said two spaced-apart shafts and tending to speed the movement of the slack part of the first mentioned chain to take up slack when the bobbin is turned faster than a

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predetermined speed, thereby to cause said brake lever to apply the brake.

9. A yarn feed and control mechanism according to claim 2 wherein means are provided to turn said bobbin shaft to let off yarn independently of any pull on said yarn.

10. A yarn feed and control mechanism according to claim 8 wherein means are provided to turn said bobbin shaft, said means including a power transmitting connection between said bobbin shaft and one of the other mentioned shafts, said last named power transmitting connection including a slipping clutch.

11. A yarn feed and control mechanism for textile machines which includes in combination, a bobbin on a bobbin shaft; a brake member operatively connected with said bobbin shaft; a contact roller mounted for operative engagement with yarn on said bobbin; a brake shoe for engaging said brake member; a constantly rotating shaft in step with the textile machine using the yarn feeding means and control mechanism; operating connections between said brake shoe, said

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contact roller and said constantly rotating shaft, said last named operating connections comprising an internally threaded shaft, a suitable bearing in which said shaft is journaled and held from endwise movement, a screw mounted in said internally threaded shaft and carrying said brake shoe, a power transmission mechanism between said constantly rotating shaft and said internally threaded shaft, and a power transmitting connection between said contact roller and said screw.

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