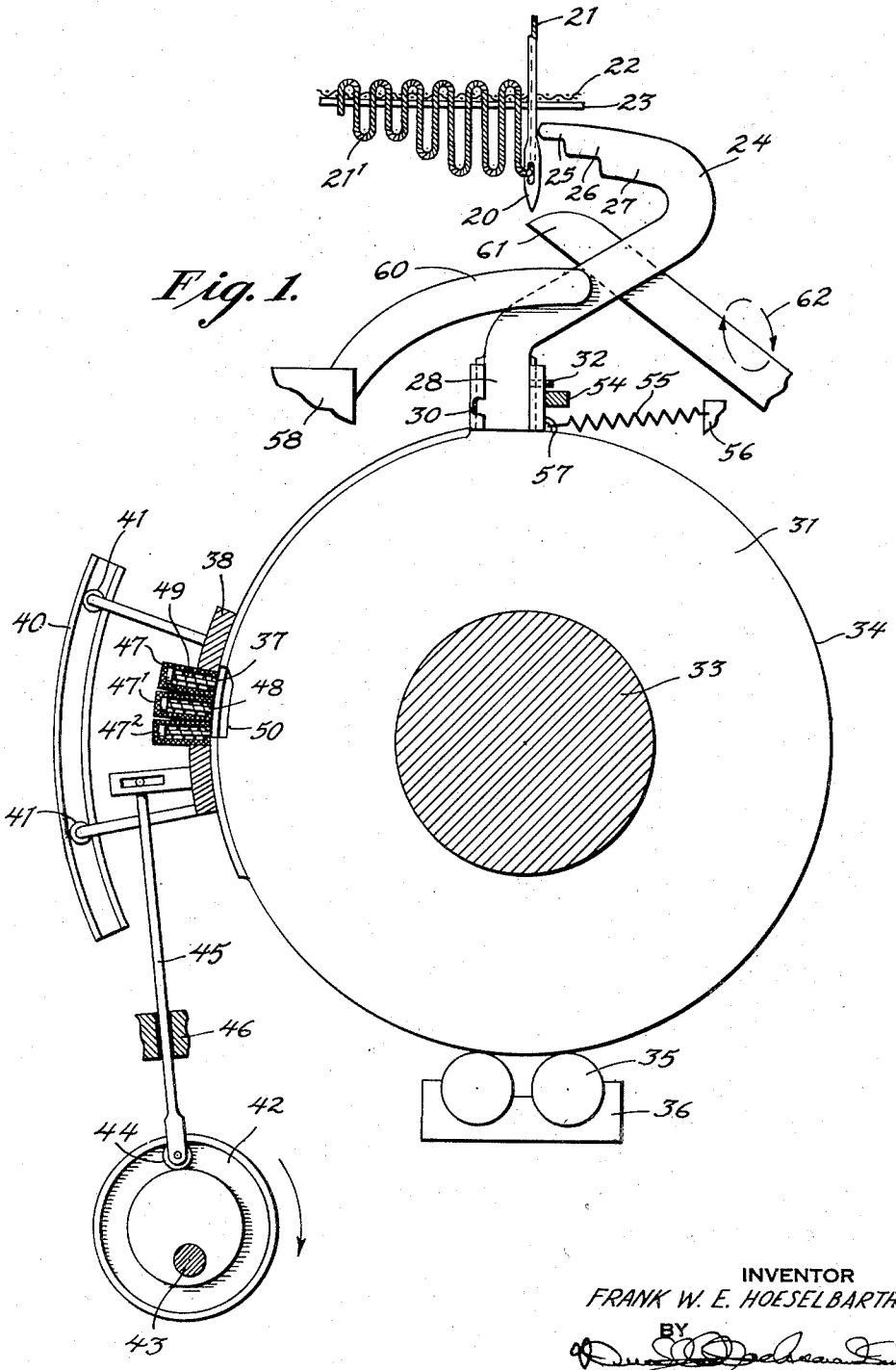
July 8, 1958 F. W. E. HOESELBARTH 2,842,080

TUFT LOOP HEIGHT CONTROLLED BY LOOPER

Filed Jan. 6, 1956 7 Sheets-Sheet 1

Fig. 1.



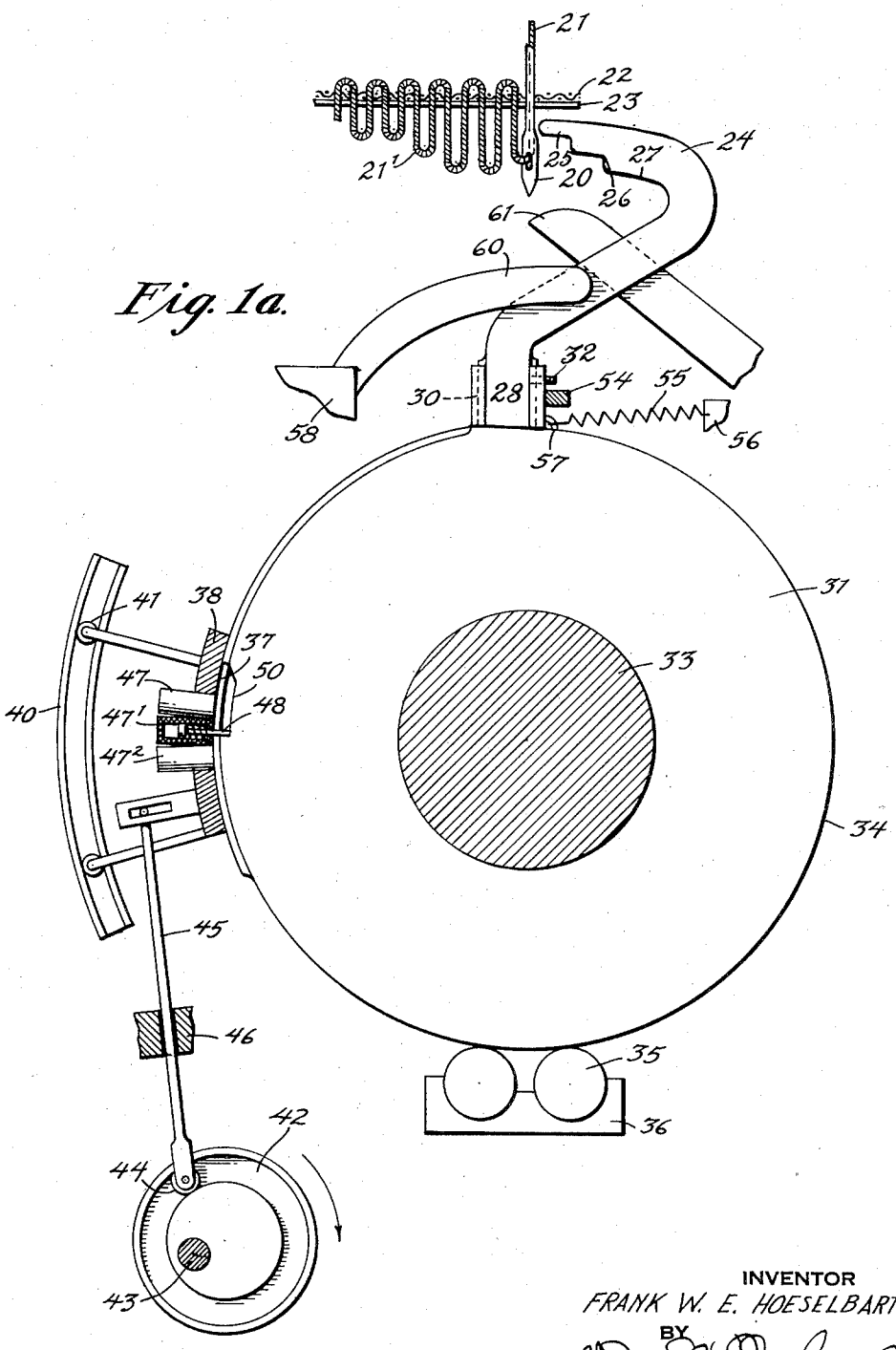
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TUFT LOOP HEIGHT CONTROLLED BY LOOPER

Filed Jan. 6, 1956 7 Sheets-Sheet 2

Fig. 1a.



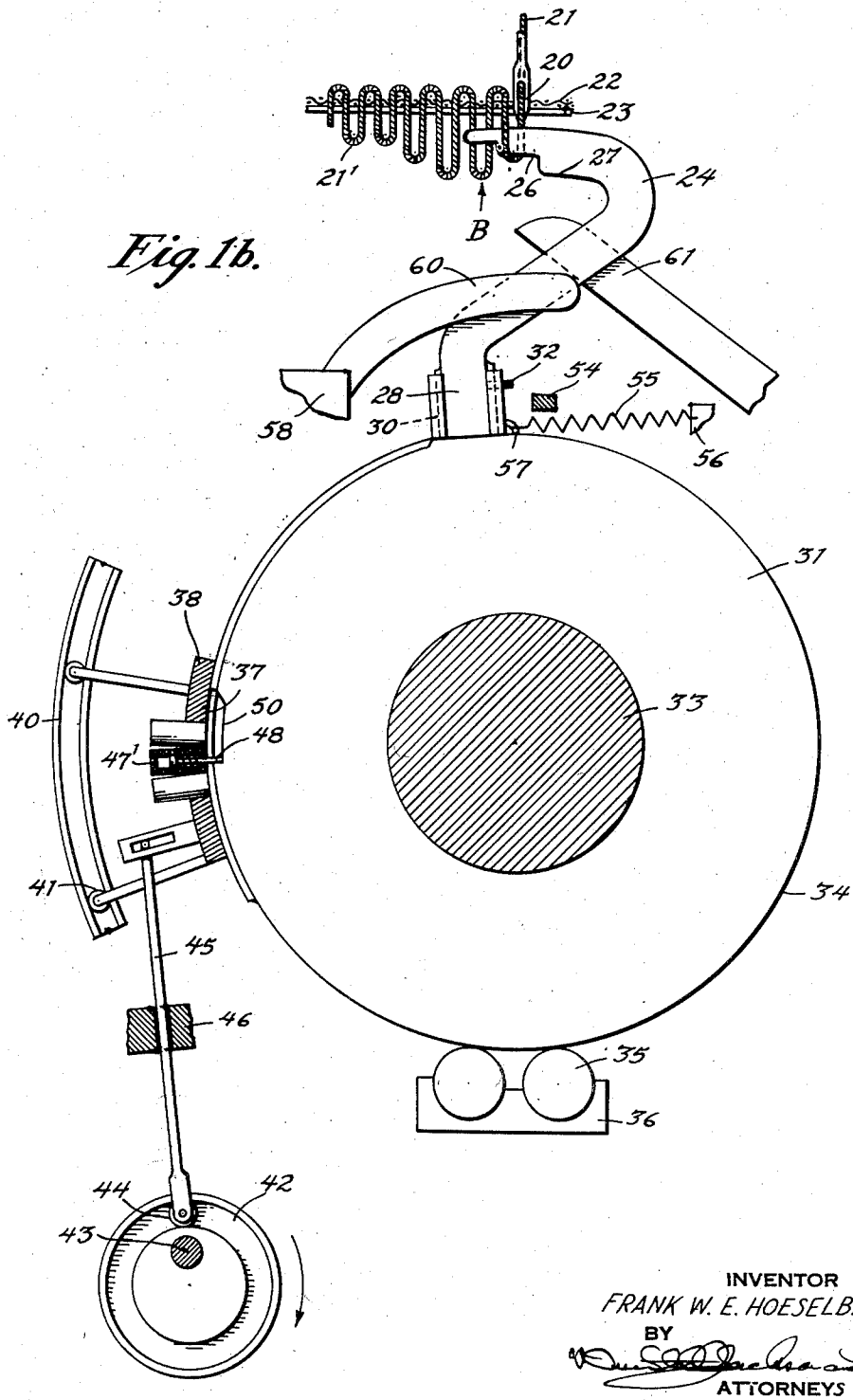
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Filed Jan. 6, 1956 7 Sheets-Sheet 3

Fig. 1b.



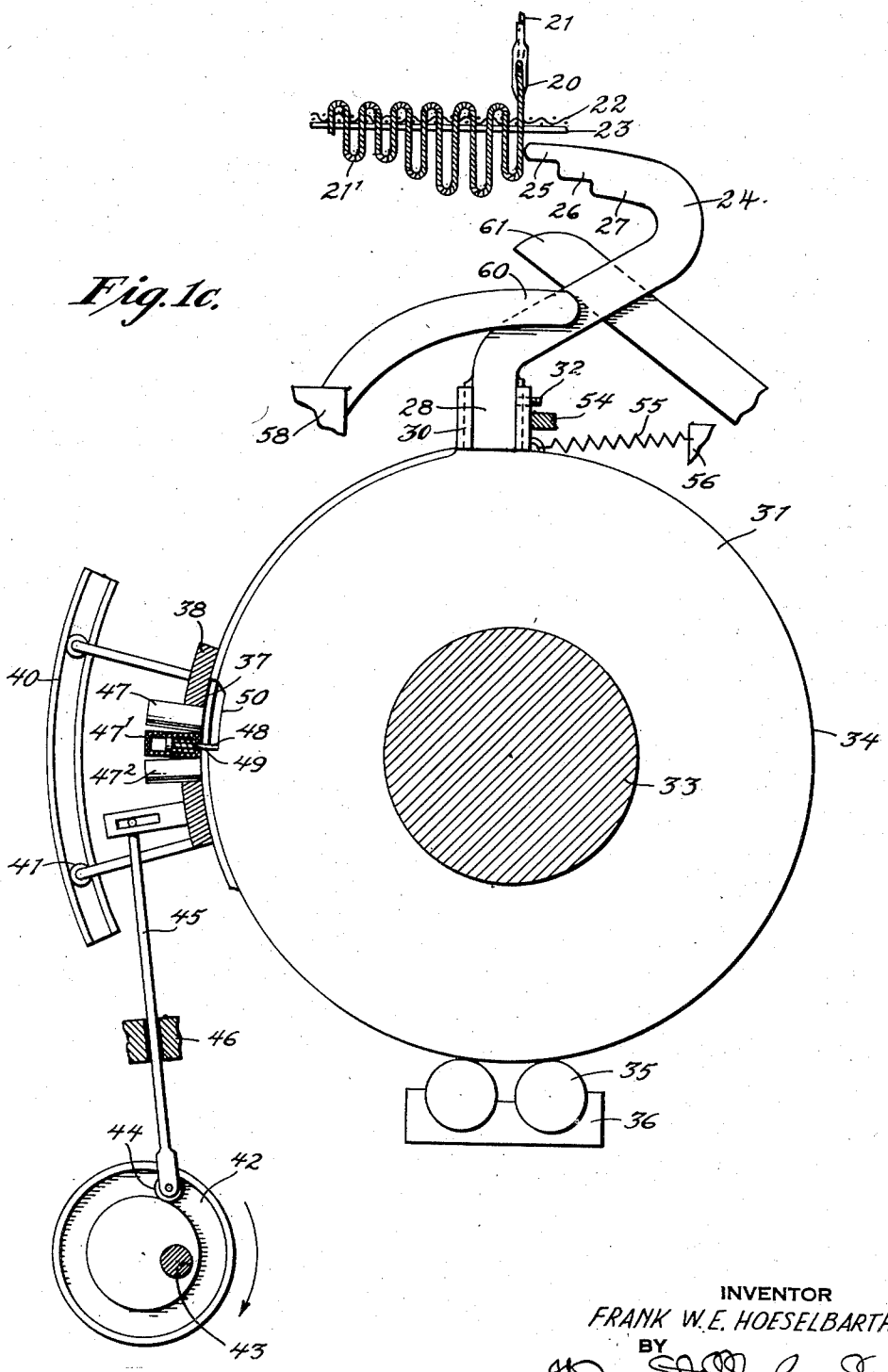
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TUFT LOOP HEIGHT CONTROLLED BY LOOPER

Filed Jan. 6, 1956 7 Sheets-Sheet 4

Fig. 1c.



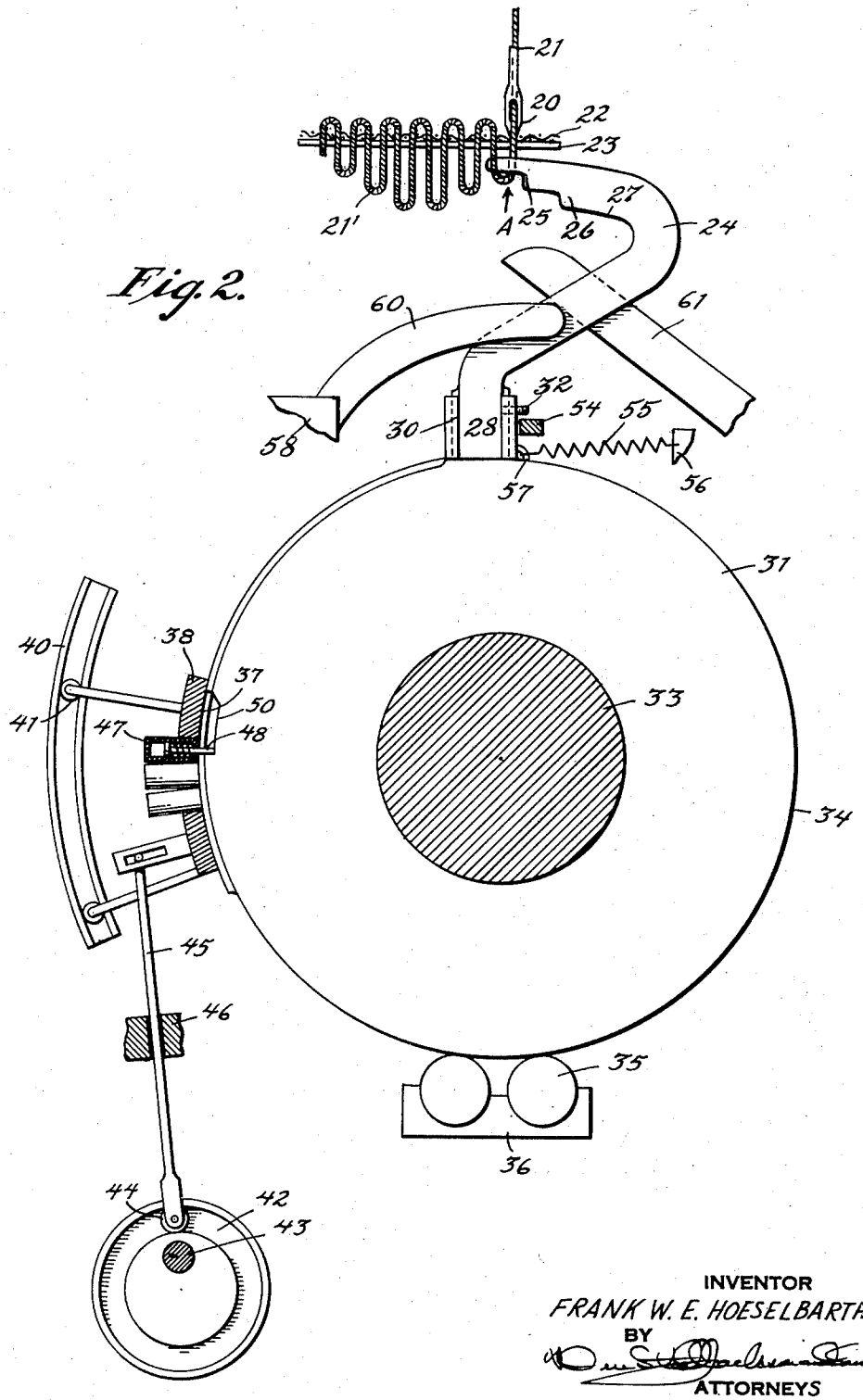
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Filed Jan. 6, 1956 7 Sheets-Sheet 5

Fig. 2.



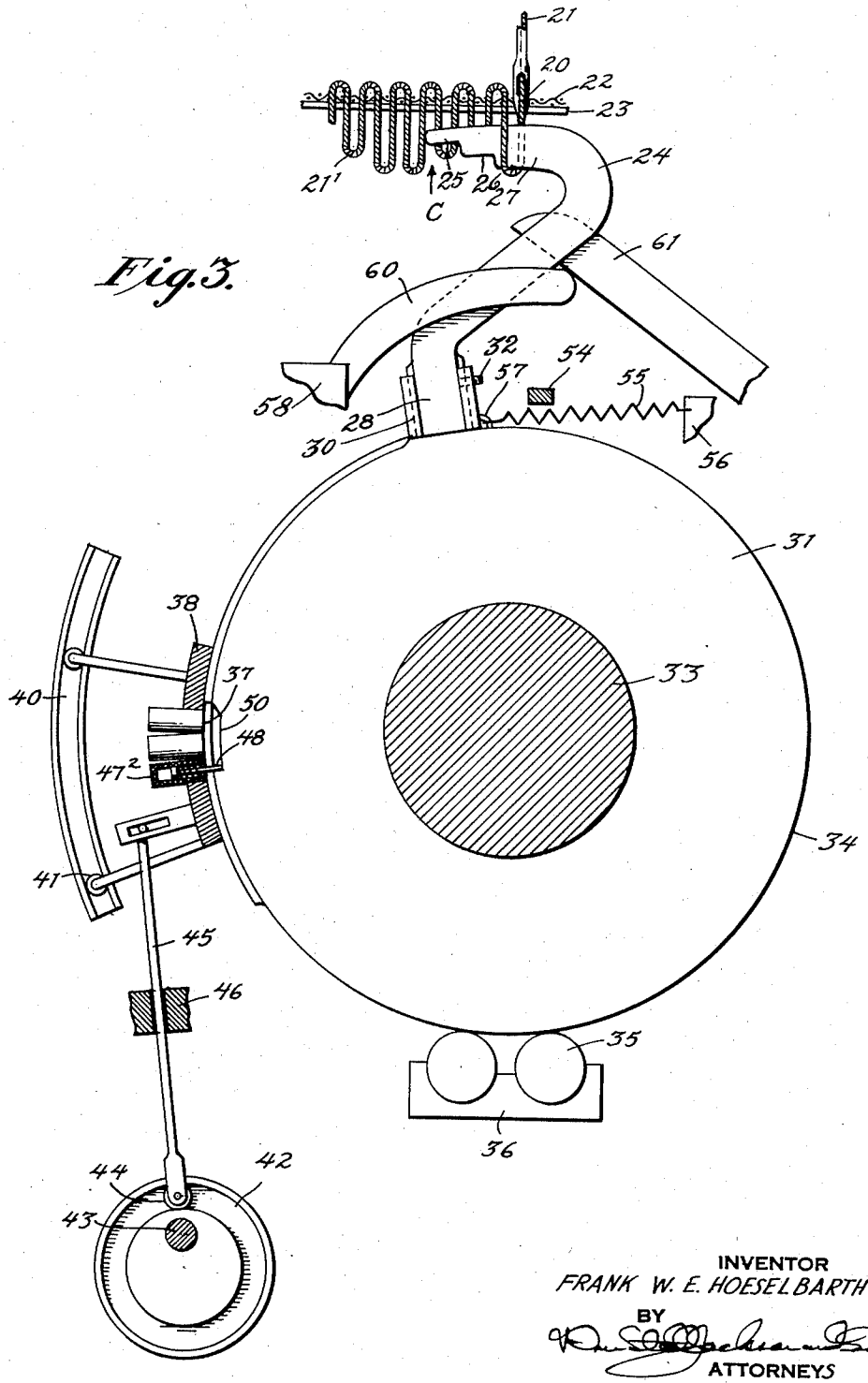
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July 8, 1958 F. W. E. HOESELBARTH 2,842,080

TUFT LOOP HEIGHT CONTROLLED BY LOOPER

Filed Jan. 6, 1956 7 Sheets-Sheet 6

Fig. 3.



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July 8, 1958 F. W. E. HOESELBARTH 2,842,080

TUFT LOOP HEIGHT CONTROLLED BY LOOPER

Filed Jan. 6, 1956 7 Sheets-Sheet 7

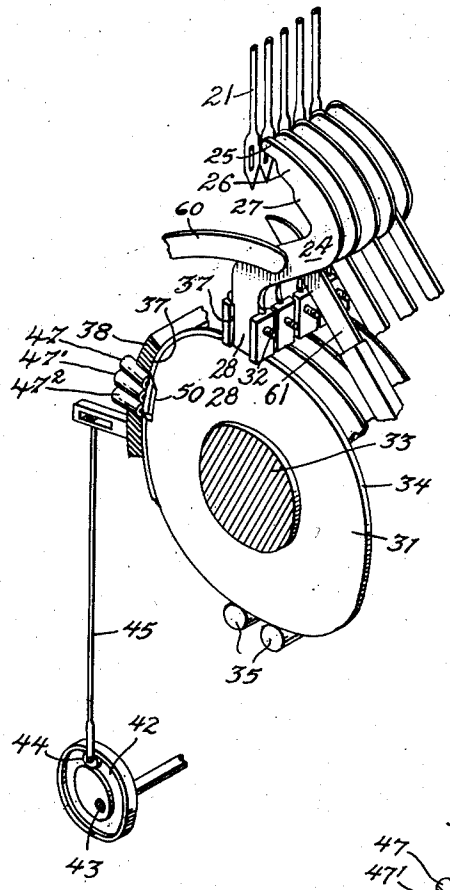


Fig. 4.

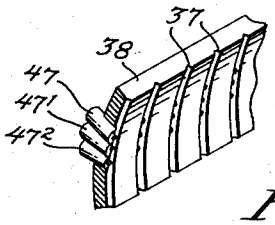


Fig. 5.

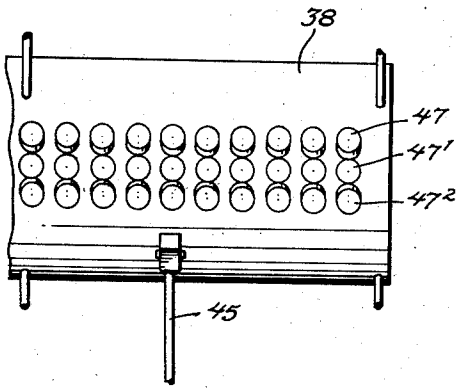


Fig. 6.

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United States Patent Office 2,842,080 Patented July 8, 1958

2,842,080

TUFT LOOP HEIGHT CONTROLLED BY LOOPER

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Application January 6, 1956, Serial No. 557,810

4 Claims. (Cl. 112—79)

The present invention relates to the control of the height of a tuft loop where a group or gang of needles carrying individual yarn ends forces loops of yarn through a backing fabric to form pile projections in a carpet, rug or the like.

A purpose of the invention is to permit the control at will of the height of pile projections formed by an individual yarn end, so as to permit for example selective production of pile of different heights by the loopers.

The invention is believed to find its widest application in the formation of needled carpets or rugs having pile of variant height.

In the drawings I have chosen to illustrate one only of the numerous embodiments in which my invention may appear, selecting the form shown from the standpoints of convenience in illustration, satisfactory operation and clear demonstration of the principles involved.

Figures 1, 1*a*, 1*b* and 1*c* are diagrammatic sections transverse to the length of the needle bar, showing the looper structure employed in the present invention, for four quadrant positions of the crank shaft, selecting intermediate loops.

Figure 2 is a view similar to Figure 1*b*, but selecting lowest loops.

Figure 3 is a view similar to Figure 1*b*, but selecting highest loops.

Figure 4 is a fragmentary sectional perspective of the mechanism of Figure 1.

Figure 5 is a fragmentary interior perspective of the loop position segment.

Figure 6 is a fragmentary elevation illustrating the positions of the latch solenoids on the loop position segment.

In the prior art there has not been any satisfactory solution of the problem of producing pile fabrics having loops of different heights with pattern control of the individual loop heights. The practice has been instead to produce rows of loops of one character and alternate loops of a different character, but without the ability to select and predetermine that any desired loop in a particular row may be high or low and the next loop may be low or high, as desired.

By the present invention it is possible to select any particular loop and determine that it can be high and can be different from the preceding and following loop in the same longitudinal row and also different from the adjoining loops in the same transverse row. Thus in accordance with the present invention it is possible to make all of the loops in one area high and all of the loops in another area low, according to any desired figure or design. Likewise this feature can be employed using either cut or uncut loops, as desired.

The present invention is a further development of the subject matter of my copending application, Serial No. 519,823, filed July 5, 1955, for Tufting Pattern Controlled by Looper.

The invention is illustrated herein by showing a standard needling machine which may be a Cobble machine

and omitting features which are well known such as the needle bar with its operating mechanism and the yarn feed, and showing features which are new, such as the rocker support of the loopers, and the selective motion of the loopers.

The illustration is intended to be diagrammatic, and it will of course be evident that variations will be produced as required to meet the needs of service.

The needle **20**, which is one of a gang of needles on a needle bar (not shown), extending transversely to the paper, is moved up and down by the needle bar and receives yarn **21** from a yarn feed (not shown) to advance the yarn through a backing fabric **22** resting on a slotted anvil plate **23**, as well known, to form pile **21'** having pile loops or projections of varying height.

Each needle cooperates with a looper or hook **24** which is placed below the anvil plate in conventional practice, and which is manipulated to perform the usual looper functions by engaging in the newly formed loop and holding it as the needle is retracted. The looper has forward end zones **25**, **26** and **27** of successively different thicknesses and moves forward selectively to positions A, B or C, bringing these different zones **25**, **26** or **27** into line with the needle to establish a loop of variant height depending on the particular looper portion which is actively employed. The looper also has a remote position as shown to which it is retracted as by suitable spring mechanism to engage a stop.

In accordance with the invention, the looper **24** has a shank **28** remote from its hook end which engages in a slot **30** on a rocker **31**, the looper being suitably held in place by a set screw **32**. One rocker is individual to each needle position and to each looper, and a large number of rockers journal on a common shaft **33** extending from side to side of the machine. Each rocker has a circular exterior surface **34** and rides on roller bearings **35** supported in a race **36**, the roller bearings and races extending in a series from one side of the machine to the other so as to give supplemental journal support to the shaft **33** additional to the bearing support provided at the sides (not shown). Each of the rockers turns and is guided in an arcuate slot **37** in a segment **38**. The segment is supported and pivotally mounted at intervals along its length by arcuate tracks **40** which are concentric with the axis of the shaft and receive guiding rollers **41** mounted on the segment. The segment is manipulated back and forth by track cams **42** (there are suitably several identical cams at suitable positions across the machine) on a transverse cam shaft **43** cooperating with follower roller **44** which is pivotally connected by push rod **45** guided at **46** and operatively secured to the segment.

The segment has at each rocker position a plurality of solenoids **47**, **47'** and **47²** in different angular positions, each when energized projecting forward a ratchet tooth **48** into the space of a ratchet notch **50** on a rocker. When the solenoid is not energized, its ratchet tooth or armature, as well known, is retracted by its helical compression spring **49** and does not project inwardly. The ratchet teeth of the respective solenoids are located different distances from the engaging end of the ratchet notch **50** of the rocker, so that depending on which solenoid is energized the segment will move in lost motion a greater or lesser distance before it engages the ratchet tooth.

Figure 1 shows the loopers retracted and the needles moved down, and Figure 1*a* shows a similar position with the crankshaft advanced one-quarter revolution, the solenoid **47'** energized, and its latch operating. Figure 1*b* shows the crankshaft advanced another quarter revolution and the segment 38 rotated to bring the zone **26** of the looper into the loop, and then the needle par-

tially retracted. The looper remains in this position as the needle fully retracts.

Figure 1c shows the crankshaft advanced another quarter revolution the needle still being fully retracted, and the looper being retracted.

Figure 2 is a view similar to Figure 1b, but with solenoid 47 energized at the particular looper, and the low zone 25 of the looper in the loop, forming a low loop.

Figure 3 is a view similar to Figure 1b, with the solenoid 47^2 energized at the particular looper and the high zone 27 of the looper in the loop, forming a high loop.

Thus depending on which solenoid is energized, the motion of the segment at the appropriate time brings the looper to position A, position B or position C, and assists in forming a relatively long or relatively short loop.

The segments are urged toward their retracted position in engagement with a stop 54 by a helical tension spring 55 which operates between a spring abutment 56 and a spring engagement ring 57 on the rocker.

A supporting bar 58 runs from side to side of the machine and carries a divider 60 at each looper position, the divider extending in and engaging one side of the looper below the hook and preventing deflection of the looper laterally.

If the fabric is intended to be uncut, no cutter will be used. If, however, the loops are intended to be cut, a cutter 61 is provided at the opposite side of the looper which has a restricted range of operation back and forth as suggested by the arrows 62. The cutters press the lopper, which is somewhat elastic, against the divider. Normally the cutter will be a flexible element acting like a spring, the looper will have slight flexibility and the divider will be a rigid element.

A master pattern control, not shown, is provided, which may suitably be a rotating cylinder having a series of contacts or projections which close switches, with an electric circuit from a power source to one of the solenoids or to each similar solenoid in the pattern repeat.

In operation, when the needle moves down, the loopers are positioned out of the way, retracted by the springs. After the needles move down, the segment under the action of the cam carries each looper into position to engage the loop, moving different loopers forward different distances depending on which one of the solenoids at the particular looper is energized by the pattern control. Thus a different thickness of the end of the looper is engaged above the eye of the needle and a different length of loop is established when the needle retracts. The cam now retracts the segment and the loopers retract under the action of the spring. Suitably during this rectraction, if the loops are to be cut, the cutters operate.

The loops are in any case cast off from the loopers or removed by the cutters, and the loopers are ready to function on the next cycle.

It will thus be evident that loops of three different lengths can be obtained. Of course the number of different lengths available for selection by the looper will depend on the number of positions the looper has to establish loops of different heights.

In view of my invention and disclosure, variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention without copying the structure shown, and I, therefore, claim all such insofar as they fall within the reasonable spirit and scope of my claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. Mechanism for producing needled pile fabric of different heights, including a gang of reciprocable needles and a series of loopers individually cooperating with the respective needles and having different stroke positions, each looper having an operative end for engagement with the needled loop, which looper has zones of different thicknesses depthwise, the zone of least thickness extending from the top edge of the looper and the zones of greater thicknesses being stepped rearwardly from the zone of least thickness, each zone at different looper stroke positions cooperating with the needles and which zones enable the looper to control the position of loops of different heights, in combination with means for bringing the lopers into positions to engage yarns advanced by the needles and means for selectively determining different positions of the zones of the individual loopers in cooperation with the corresponding needles so that the loopers will establish loops of different heights.

2. Mechanism according to claim 1, in cooperation with cutter means to cut the loops and obtain cut pile of varying length.

3. Mechanism according to claim 1, in which said first means includes rockers mounting the individual loopers, each of the rockers having a notch, a shaft journalling the various rockers, segment means cooperating with the periphery of each rocker, selective latches mounted on each segment means and adapted to operatively engage with the notch in a particular position of each of said latches, and means for advancing the segment means.

4. Mechanism according to claim 1, in combination with bearings engaging the sides of the rockers remote from the sides at which the needles are located.

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