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Higgins

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[54] **VARIABLE ECCENTRIC AND LOCATING PLATE**

[75] Inventor: **John Higgins,** Goose Green, England

[73] Assignee: **The Singer Company,** New York, N.Y.

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[52] **U.S. Cl.** ..... **112/79 R,** 74/571 M, 112/221

[51] **Int. Cl.** **D05c 11/06**

[58] **Field of Search** ..... 112/79 R, 79 A, 266, 220, 112/221; 74/571 M

[56] **References Cited**

UNITED STATES PATENTS

2,592,237	4/1952	Bradley	74/571 M
2,961,982	11/1960	Wear	112/79 R
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FOREIGN PATENTS OR APPLICATIONS

685,936	12/1939	Germany	112/221
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Primary Examiner—Werner H. Schroeder

Attorney, Agent, or Firm—Robert E. Smith; Edward L. Bell; Alan Ruderman

[57] **ABSTRACT**

A tufting machine in which a double eccentric is utilized to vary the stroke of the needle bar and in which an adjusting device is associated with the connecting rod and is manipulatable to maintain the bottom dead center position of the needle bar regardless of variation in stroke.

6 Claims, 6 Drawing Figures

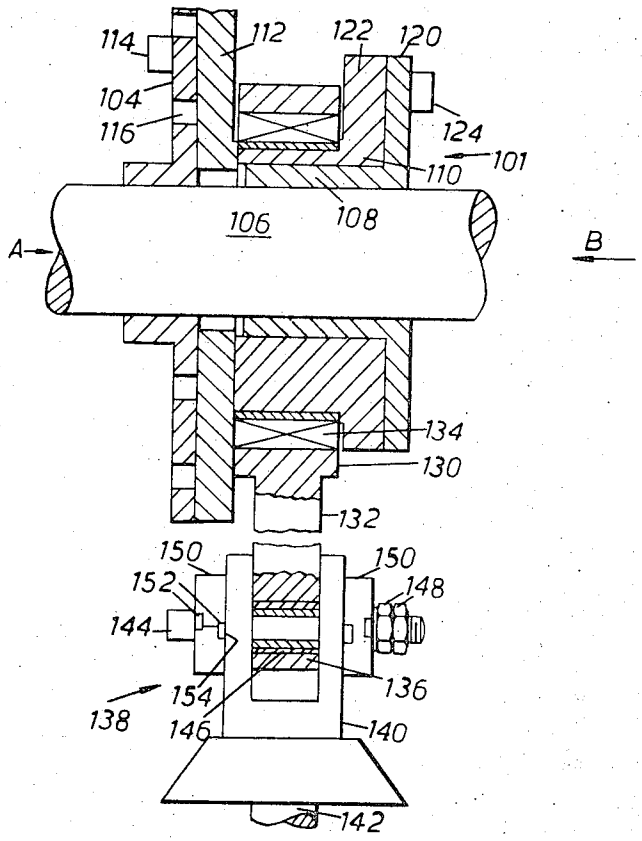


FIG. 2

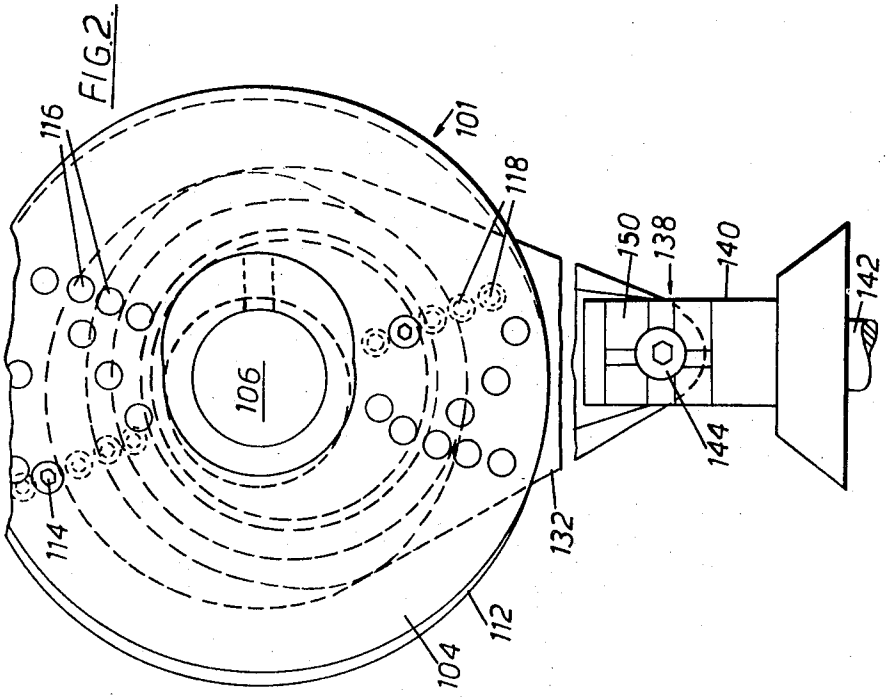
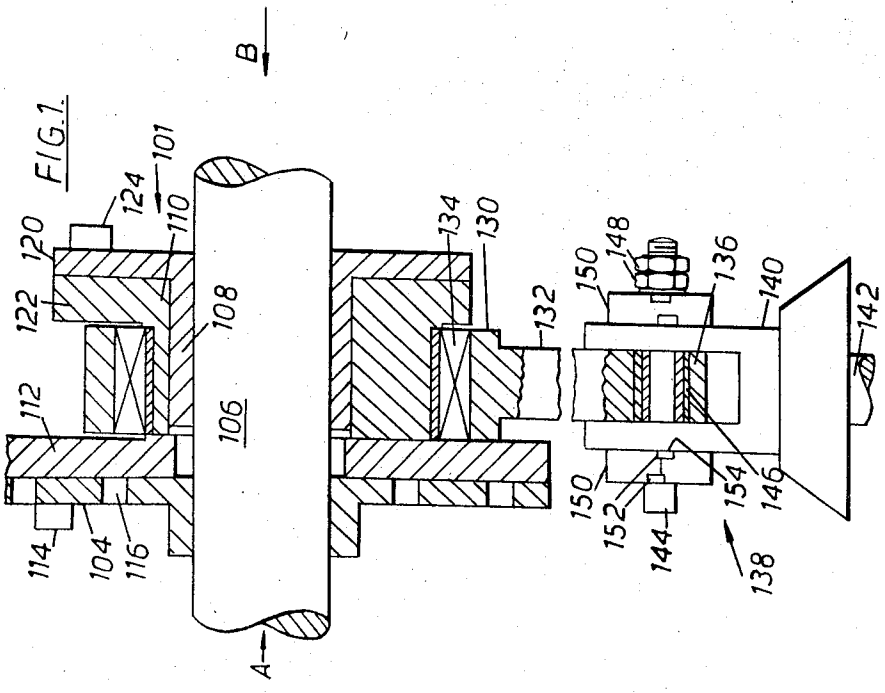

116
101
118
150
138
140
142
106
144
114
132
112
104

FIG. 1


B
124
101
110
120
134
130
150
148
136
140
142
122
108
132
112
106
114
104
116
150
152
144
154
146
138
A

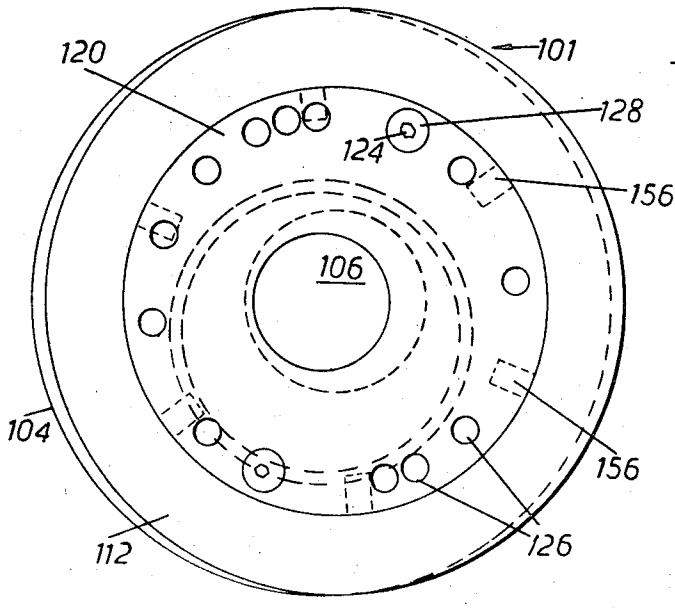

120
101
128
124
156
106
104
156
112
126

FIG.3

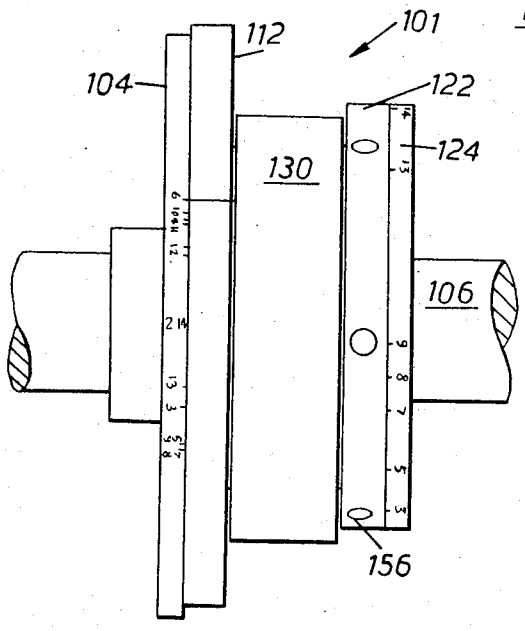

112
101
104
122
124
130
106
156

FIG.4

FIG. 5.

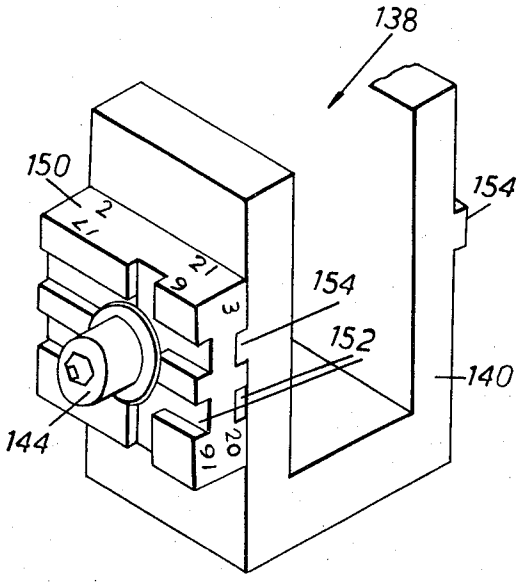
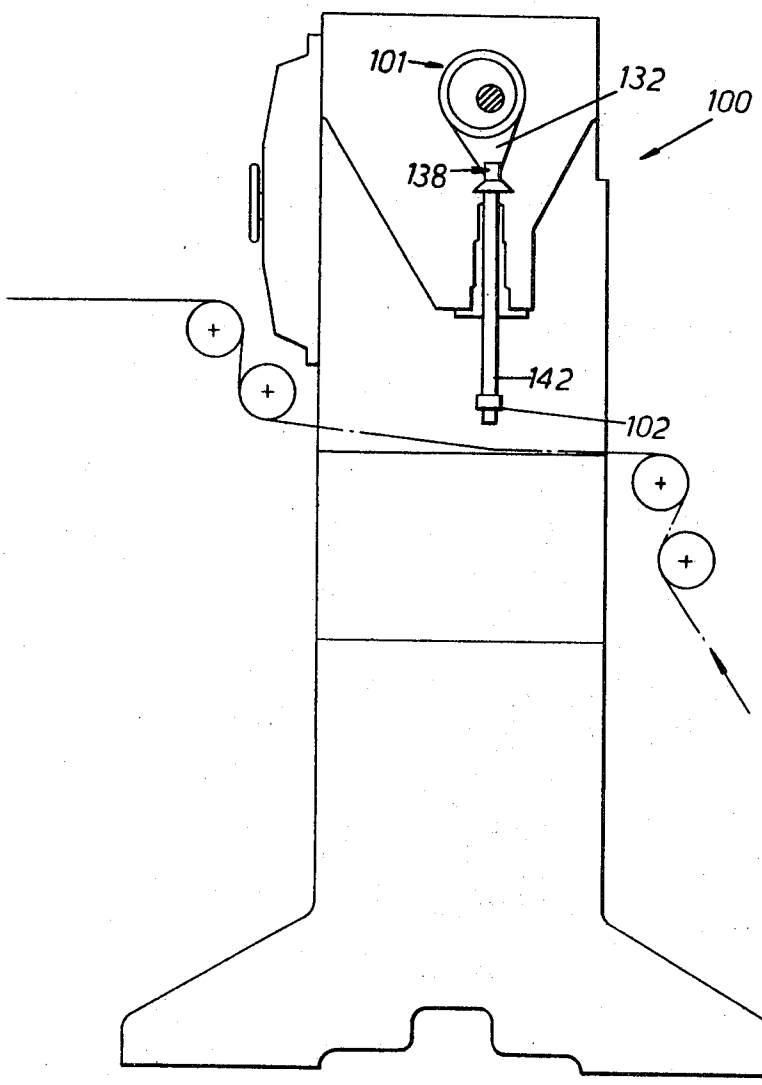


FIG.6.



VARIABLE ECCENTRIC AND LOCATING PLATE

BACKGROUND OF THE INVENTION

The present invention relates to tufting machines capable of producing articles such as pile carpets. It is standard on such machines to incorporate the capability of varying needle bar stroke in order to effect a variation in pile depth as may be desired. It has also been conventional to utilize a double eccentric mechanism to effectuate such stroke variation. The use of double eccentric mechanisms to regulate the stroke of a reciprocable member, such as a knitting needle, has been known heretofore. For example, U.S. Pat. No. 2,459,587 issued Jan. 18, 1949 discloses the use of such a double eccentric mechanism to vary the stroke of a knitting needle employed in the mending of hosiery. U.S. Pat. No. 2,477,587 issued Aug. 2, 1949 illustrates the use of a double eccentric mechanism to provide for variation in the stroke of a punch press. In the tufting art, however, it has heretofore been necessary to make relatively complicated and time consuming adjustments including in some cases adjustments in the bed plate and looper bar mechanism to accomodate changes in needle bar stroke. Any such changes in looper bar mechanism setting, usually also occasioning a change in timing, were extremely time consuming and necessarily resulted in substantial down or inoperative time for the machine.

SUMMARY OF THE INVENTION

It is one object of the present invention to provide a tufting machine in which needle bar stroke can be varied without necessitating readjustment of the looper bar mechanism. It is another object of this invention to provide a tufting machine in which needle bar stroke can be varied without the need for a time-consuming readjustment in the timing of the machine.

It is still another object of this invention to provide a tufting machine in which the needle bar stroke can be readily altered and the bottom dead center position of the needle bar can be maintained at any predetermined position.

Other objects and advantages of the invention will become readily apparent from the following description of the invention.

According to the present invention there is provided in a tufting machine having a drive shaft, a connecting rod operably connected thereto for reciprocating movement, a needle bar drivable reciprocably by said connecting rod, and double eccentric means for regulating the stroke of said needle bar, the improvement comprising a first eccentric rotatable on said drive shaft into any one of a plurality of preselected positions and a second eccentric carried by said first eccentric and rotatable into any one of a plurality of preselected positions relative to said first eccentric to thereby establish the desired stroke for said needle bar, means for locking said first and second eccentrics in fixed relation to each other and in preselected position relative to said drive shaft, and adjusting means associated with said connecting rod for maintaining the bottom dead center position of said needle bar at a predetermined position regardless of the variation in stroke effected for said needle bar.

BRIEF DESCRIPTION OF THE DRAWINGS

In order that the invention may be more fully comprehended it will now be described, by way of example, with reference to the accompanying drawings in which:

FIG. **1** is a side elevation of a variable eccentric assembly and an adjusting device in sectional view;

FIG. **2** is an end elevation in the direction of the arrow A in FIG. **1** of the assembly and device shown in FIG. **1**;

FIG. **3** is an end elevation in the direction of the arrow B in FIG. **1** of the assembly in FIG. **1**;

FIG. **4** is a plan view of the assembly shown in FIG. **1**;

FIG. **5** is a perspective view of the adjusting device shown in FIG. **1**; and

FIG. **6** is an end view in vertical cross section of a tufting machine having the variable eccentric assembly and the adjusting device incorporated therein.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings a tufting machine indicated generally by the reference numeral **100** has a variable eccentric assembly **101** for imparting an adjustable stroke to a needle bar **102** of the tufting machine. The eccentric assembly includes a locating flange **104** keyed to a drive shaft **106** of the tufting machine, a first or inner eccentric **108** journalled on the shaft and rotatable into any one of a plurality of preselected positions, and a second or outer eccentric **110** journalled on the inner eccentric **108** and rotatable into any one of a plurality of preselected positions relative to the first eccentric. As shown, outer eccentric **110** has a securing flange **112** abutting the locating flange **104.** However, as will be readily appreciated it is possible to provide the securing flange on either of the eccentrics. Numbered locating marks and a reference mark are provided on the circumferential faces of said locating and securing flanges, respectively, so that the relative positions of the outer eccentric and the shaft may be noted.

When the outer eccentric **110** is rotated into any one of the preselected positions on the shaft, as shown by the required locating mark being in register with the reference mark, a screw **114** is passed through a plain bore **116** on the locating flange **104** to connect with a threaded bore **118** in the securing flange **112,** thus locking the outer eccentric relative to the shaft. A plurality of such plain bores **116** and threaded bores **118** are provided on the locating and the securing flanges respectively but only one pair of these bores are in register in each preselected position.

The inner and the outer eccentrics **108** and **110** are provided with annular flanges **120** and **122** respectively at the ends thereof remote from the locating plate **104.** The circumferential face of the flange **120** is provided with numbered locating marks, corresponding to the marks on the locating flange **104** and the flange **122** is provided with a reference mark so that the relative positions of the eccentrics and thus the stroke of the needle bar may be noted. In any preselected relative position of the eccentrics a screw **124** is passed through a plain bore **126** on the flange **120** into a registering threaded bore **128** in the flange **122** and thus the flanges are connected together.

One end **130,** i.e., the big end, of a connecting rod **132** is rotatably mounted on bearings **134** on the outer eccentric, the other end **136** i.e., the small end of the connecting rod, being pivotably connected with the

needle bar **102** by way of an adjusting device **138** for adjusting the bottom dead centre position of the needle bar to any desired position. This device is thus used to ensure that for all lengths of stroke the bottom dead centre position of the needle may be maintained constant.

The adjusting device **138** comprises a clevis **140** attached to the needle bar **102** by means of a push rod **142.** The clevis has in each of its opposed parallel limbs a vertical slot to accommodate a pivot bolt **144** passing therethrough. The small end of the connecting rod pivots on bearings **146** about the bolt **144,** and nuts **148** are provided to prevent the bolt from moving in an axial direction.

To locate the bolt **144** accurately in the slots, locating plates **150** are provided on either side of the clevis, the bolt **144** passing through a close fitting aperture in each of the plates. The plates **150** are each provided with a corresponding arrangement of grooves **152** running both horizontally and vertically across two opposite end faces thereof, the plates being reversible. Each pair of corresponding selected grooves on the plates **150** is dimensioned to receive a horizontal raised rib **154** provided on each of the outer faces of the parallel limbs of the clevis. In this manner the pivot bolt **144** can be moved further from or closer to the needle bar **102,** thus adjusting the bottom dead centre position of the needle bar. The grooves are each marked with an identifying number so that the correct groove may be selected for a given length of stroke to maintain constant the bottom dead centre position of the needle bar.

To adjust the length of stroke, the machine is stopped with the needles at the bottom of the stroke and the screws **114** and **124** are removed. A tommy bar (not shown) is placed into one of a plurality of holes **156** located around the circumferential face of the flange of the outer eccentric, and the inner and/or the outer eccentric is rotated until the required locating mark, indicating the length of stroke on said flange **120,** is aligned with the reference mark on the flange **122.** The eccentrics **103** and **110** are secured together by means of the screw **124.**

The inner and the outer eccentrics are rotated together until the locating mark on the locating flange **104** corresponding to said locating mark on the inner eccentric is aligned with the reference mark on the securing flange **112.** This ensures that there is no change in timing of the needle bar with respect to the shaft. The securing flange **112** is then locked to the locating flange **104** by means of the screw **114.**

To adjust the bottom dead centre position of the needle bar to maintain it at a constant location, the bolt **144** is loosened or removed and the selected pair of corresponding grooves are each positioned to receive the respective rib. Preferably to simplify the selection of the grooves, the groove identifying numbers on the locating plates **150** are chosen such that if the bottom dead centre position was previously correct, then it will be sufficient to maintain the same difference between the groove number and the stroke length locating mark number as was previously present. To alter the bottom dead centre position in the embodiment shown in the drawings setting the groove number to a lower number, e.g., 5 to 4 will lower the position by 1/32 inch, 5 to 3 will lower by 1/16 inch and vice versa.

Preferably, also for the sake of simplicity, the locating plates **150** have a maximum of two horizontal and two vertical grooves per face and the groove numbers are located at the edge nearest the clevis, the lowest number referring to the bottom groove.

When adjusting the stroke of the needle bar of the tufting machine, the stroke of the individual push rods **142** should be adjusted one eccentric assembly and set of locating plates at a time, in order to assist in maintenance of needle pick up position.

When adjusting the pick up position, it may be possible to make a small adjustment by releasing several sets of locating plates **150** and using needle bar deflection to enable the new pick up location to be set. Alternatively, the needle bar may be supported by chocks while all locating plates **150** are released and re-set.

It will be understood that various changes in the details materials, arrangements of parts and operating conditions which have been herein described and illustrated in order to explain the nature of the invention may be made by those skilled in the art within the principles and scope of the invention.

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

1. In a tufting machine having a drive shaft, a connecting rod operably connected thereto for reciprocating movement, a needle bar drivable reciprocably by said connecting rod, and double eccentric means for regulating the stroke of said needle bar, the improvement comprising a first eccentric rotatable on said drive shaft into any one of a plurality of preselected positions and a second eccentric carried by said first eccentric and rotatable into any one of a plurality of preselected positions relative to said first eccentric to thereby establish the desired stroke for said needle bar, means for locking said first and second eccentrics in fixed relation to each other and in preselected position relative to said drive shaft, and adjusting means associated with said connecting rod for maintaining the bottom dead centre position of said needle bar at a predetermined position regardless of the variation in stroke effected for said needle bar.

2. A tufting machine according to claim **1,** wherein said adjusting means comprises a clevis having in each of its opposed parallel limbs a slot aligned with the longitudinal axis of the respective limb, the outermost face of each of said limbs being provided with a rasied rib extending perpendicularly to the longitudinal axis of the respective limb, a pair of removable locating plates being provided for positioning on the respective outermost faces of the clevis, each of said plates having an arrangement of grooves therein dimensioned for selective reception of the respective rib and each having an aperture therethrough, a pivot bolt extending between the plates through said slots in the clevis, said bolt being operatively connected to one of said connecting rod and needle bar, and the clevis being thus fixedly secured to one of said needle bar and connecting rod.

3. A tufting machine according to claim **1,** wherein a radially projecting annular locating flange is keyed to said drive shaft, one of said eccentrics has a radially projecting annular flange and the other of said eccentrics has two radially projecting annular flanges, one of said flanges on said other eccentric abuts the said locating flange, the second of the flanges on said other eccentric abuts the flange on said one eccentric, locating and reference marks being provided on the circumferential faces of said flanges to indicate the preselected position of said other eccentric relative to said drive

shaft and the position of said other eccentric relative to said one eccentric.

4. A tufting machine according to claim **3,** wherein one flange of each pair of abutting flanges is provided with a plurality of threaded bores and the other flange of each pair of abutting flanges is provided with a plurality of plain bores, the bores being arranged such that for each pair of abutting flanges one plain bore will be in register with one threaded bore in each preselected position, the pair of flanges then being lockable together by means of a threaded member engageable in said registering bores.

5. A tufting machine according to claims **2** and **3,** wherein the grooves on the said locating plates have identifying marks bearing a relationship with the marks on the eccentric assembly.

6. A tufting machine according to claim **3,** wherein said one eccentric is said first eccentric and said other eccentric is said second eccentric.

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