United States Patent [19]

Braner et al.

[11] **3,727,503**

[45] **Apr. 17, 1973**

[54] **SLITTER HAVING PIVOTAL MULTIPLE SPACED PAIRS OF ARBORS**

[75] Inventors: **Harold R. Braner,** Chicago; **William C. Jasinski,** Arlington Heights; **Douglas S. Matsunaga; Agapito Valencia,** both of Chicago, all of Ill.

[73] Assignee: **Braner Engineering, Inc.,** Chicago, Ill.

[22] Filed: **Nov. 26, 1971**

[21] Appl. No.: **202,237**

[52] **U.S. Cl.** **83/479,** 83/481, 83/492, 83/498, 83/699

[51] **Int. Cl.**.....**B26d 1/24,** B23d 19/04

[58] **Field of Search**.....83/479, 480, 481, 83/492, 498, 552, 699

[56] **References Cited**

UNITED STATES PATENTS

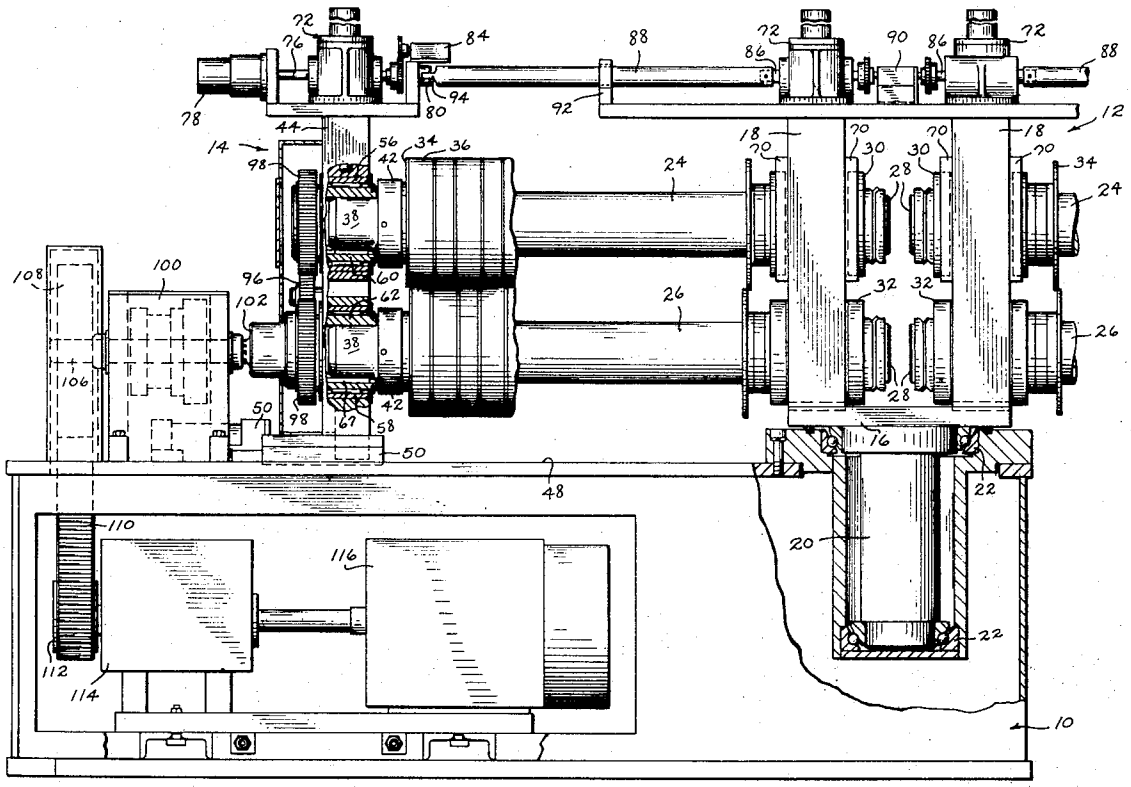
2,291,789	8/1942	Behrens	83/479 X
3,260,146	7/1966	Child	83/479
3,513,743	5/1970	Montguire	83/479 X

Primary Examiner—Frank T. Yost
Attorney—Oltsch & Knoblock

[57] **ABSTRACT**

A slitter having multiple spaced pairs of arbors pivotally mounted to the slitter frame. Each pair of arbors is adapted to carry cutter assemblies which can be pivoted into operating position at the selection of the user of the slitter.

6 Claims, 4 Drawing Figures



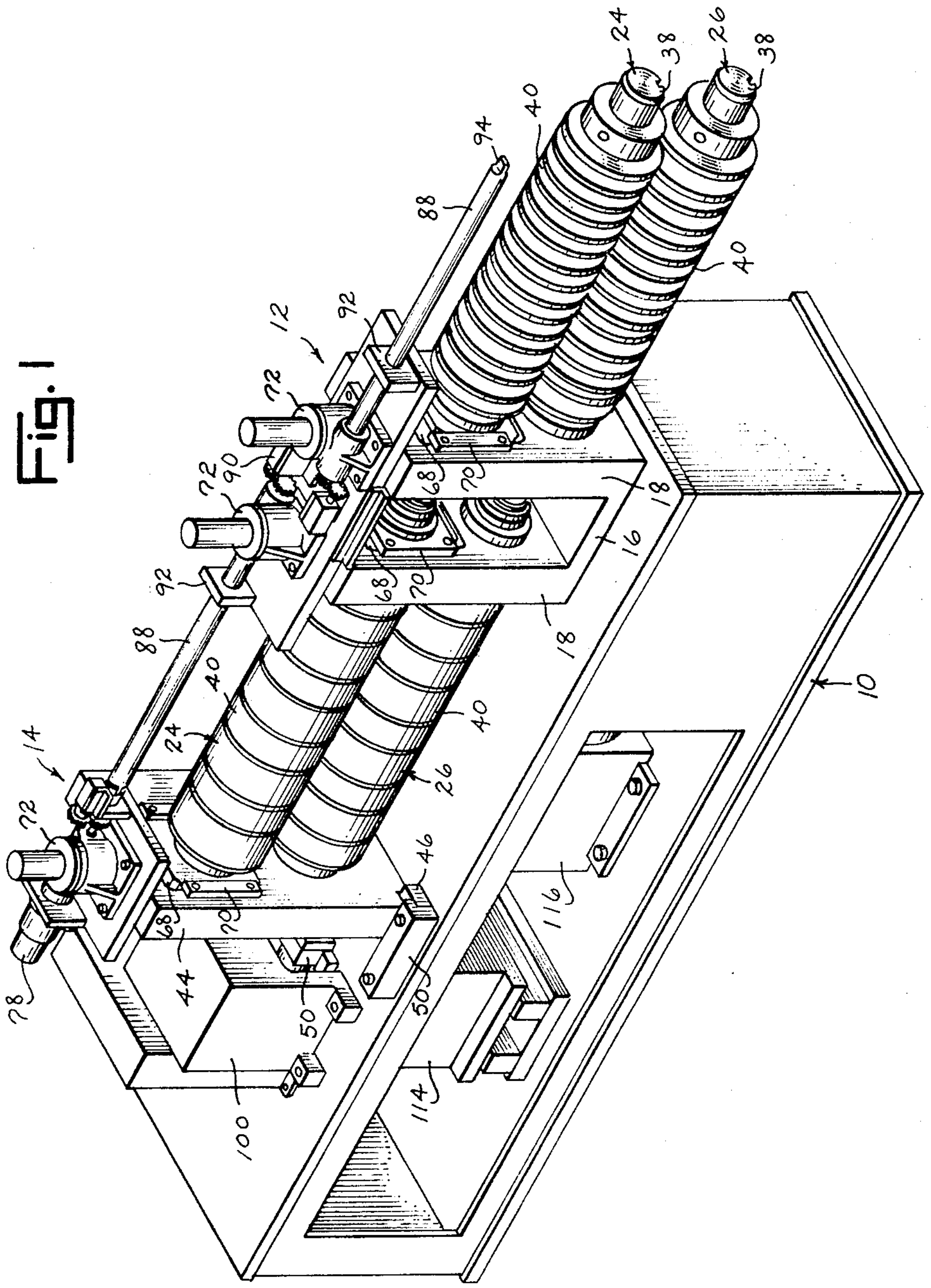


Fig. 1

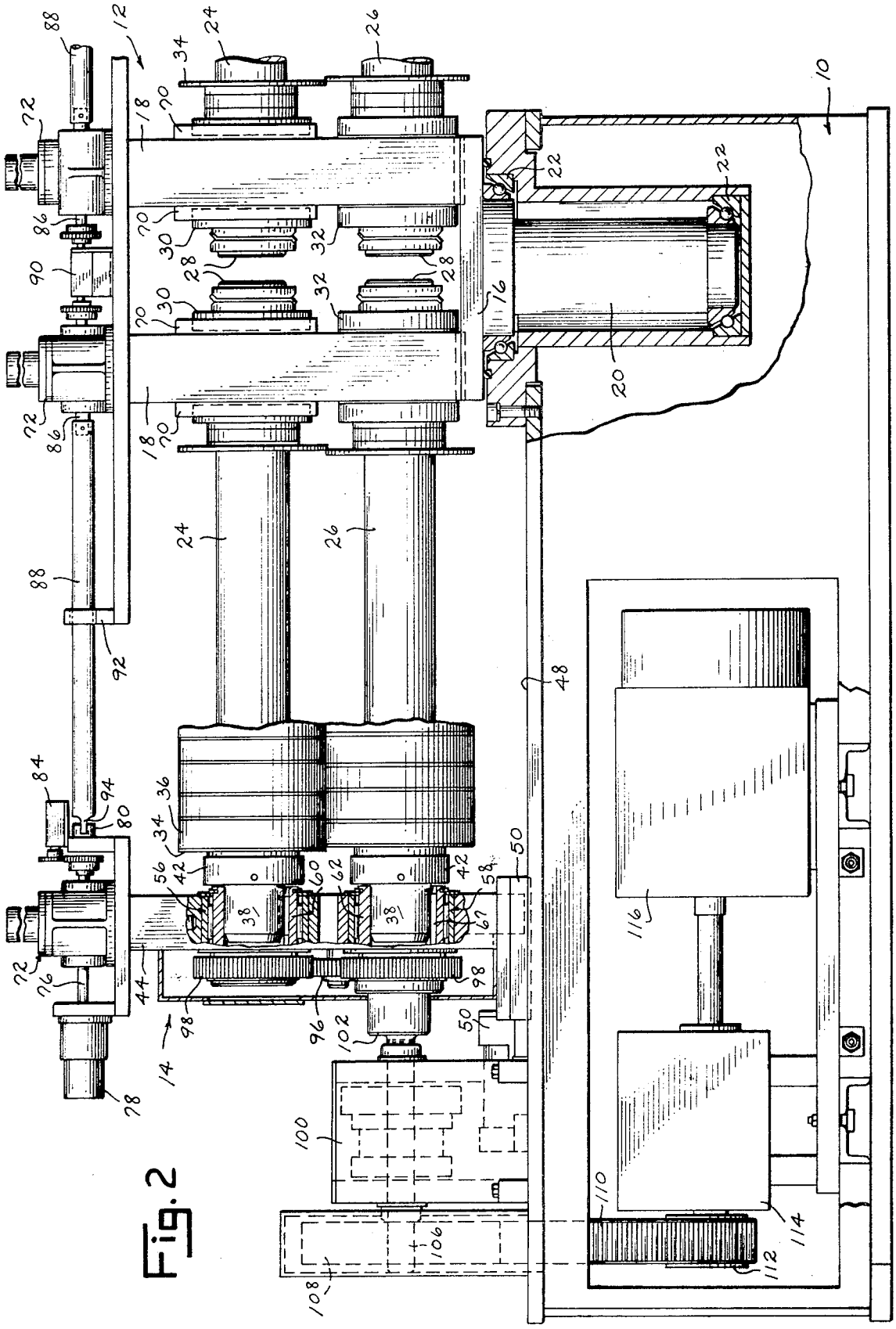


Fig. 2

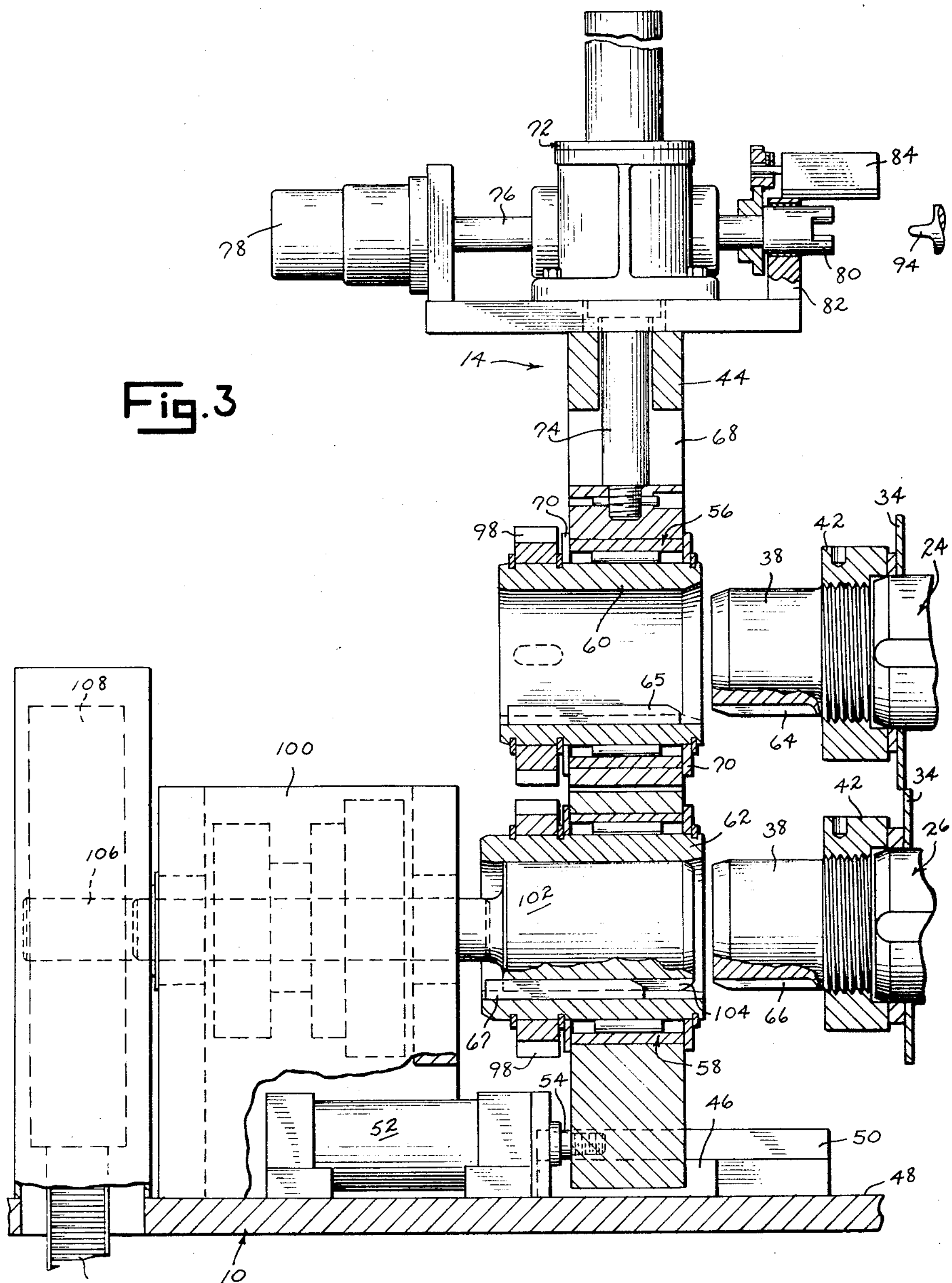

72
84
76
78
80
94
82
14
44
74
68
70
56
98
34
42
24
38
60
65
64
70
34
42
108
100
62
38
26
106
102
104
66
67
98
58
54
46
52
50
48
110
10

Fig. 3

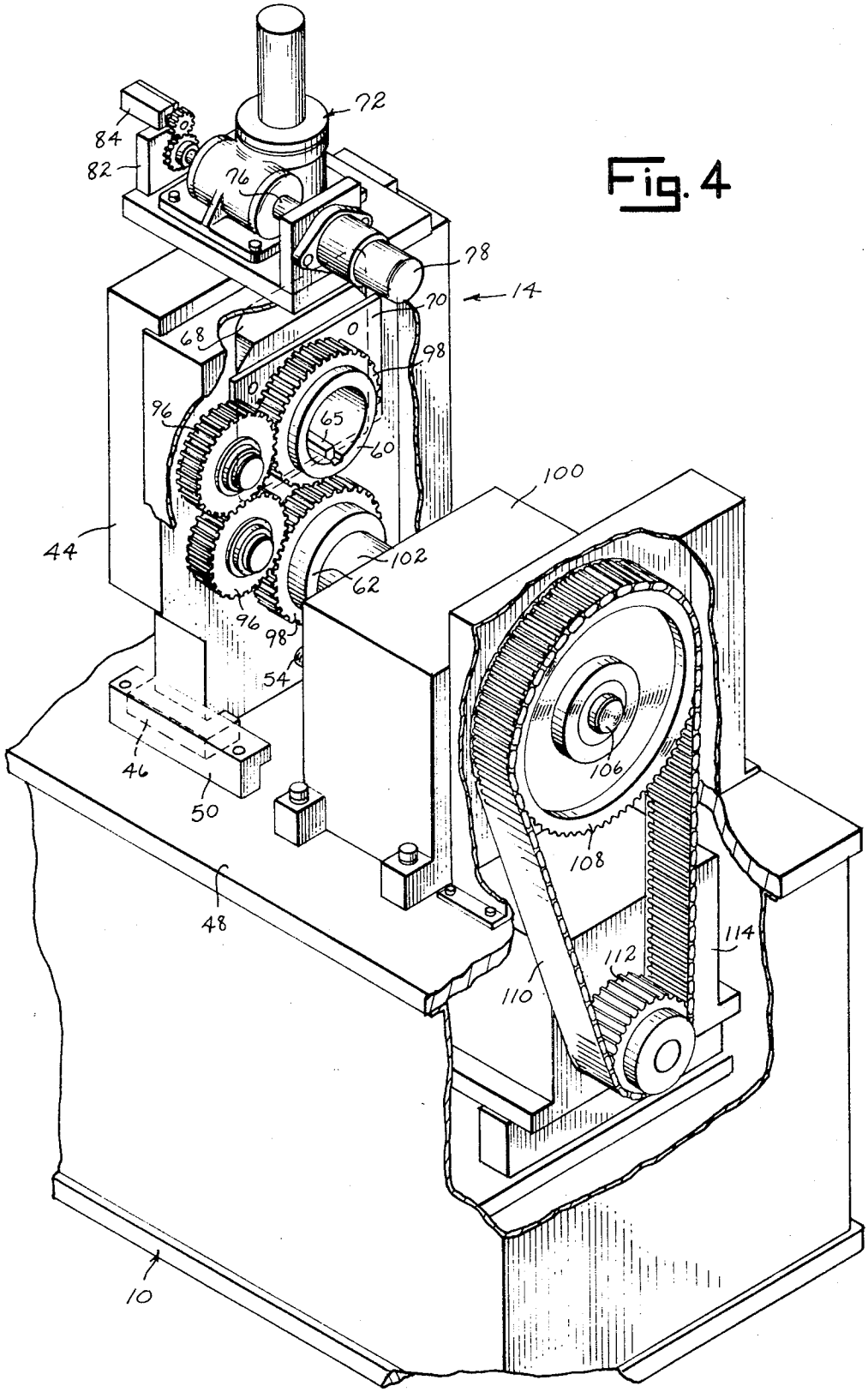

72
84
82
76
78
70
14
68
98
96
65
60
100
44
102
62
96
98
54
46
50
48
106
108
114
112
110
10

Fig. 4

SLITTER HAVING PIVOTAL MULTIPLE SPACED PAIRS OF ARBORS

SUMMARY OF THE INVENTION

This invention relates to a slitter which can carry a plurality of cutting assemblies to enable the user of the slitter to rapidly and efficiently change from one slitting operation to another.

The slitter of this invention includes a frame carrying first and second spaced bearing housings. The first bearing housing is pivotally connected to the frame and carries multiple spaced pairs of arbors. Each pair of arbors constitutes upper and lower arbors which are each journaled at one end to the first bearing housing and which are adapted to carry removable cutter assemblies. Each pair of arbors is alignable with the second bearing housing upon pivotal movement of the first bearing housing. The second bearing housing supports and journals the opposite ends of the aligned pair of arbors. During each slitting operation one selected pair of the arbors will be supported between and journaled within both bearing housings. At least one arbor of the pair of arbors so journaled within the bearing housings is preferably power driven by a driving mechanism carried by the second bearing housing. As one slitting operation is being conducted, the user of the slitter can assemble the cutter assemblies required for the next slitting operation on one of the remaining pairs of arbors. Once the current slitting operation is completed, the second bearing housing is operatively disassociated from the arbors used in the completed operation and the first bearing housing pivoted to bring another pair of arbors carrying the newly assembled cutters thereon into alignment and operative association with the second bearing housing in preparation for starting a second slitting operation.

Accordingly, it is an object of this invention to provide a slitter carrying a plurality of spaced pairs of arbors each being pivotal into an operative slitting position.

Another object of this invention is to provide a slitter having multiple spaced pairs of arbors, each being shiftable into driving contact with a bearing housing carried by the slitter.

It is another object of this invention to provide a slitter having a frame which carries first and second bearing housings and a plurality of spaced pairs of arbors which are carried by the first bearing housing and shiftable into supporting contact with the second bearing housing.

Still another object of this invention is to provide a slitter having multiple spaced pairs of arbors each usable for a different slitting operation.

Still another object of this invention is to provide a slitter which is of efficient and time-saving operation.

Other objects of this invention will become apparent upon a reading of the invention's description.

BRIEF DESCRIPTION OF THE DRAWINGS

A preferred embodiment of this invention has been chosen for purposes of illustration and description wherein:

FIG. 1 is a perspective view of the slitter.

FIG. 2 is a fragmentary side view of the slitter.

FIG. 3 is a fragmentary view in sectional form of a portion of the slitter.

FIG. 4 is a perspective view of one end of the slitter.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The preferred embodiment illustrated is not intended to be exhaustive or to limit the invention to the precise form disclosed. It is chosen and described in order to best explain the principles of the invention and its application and practical use to thereby enable others skilled in the art to best utilize the invention.

The slitter illustrated in the drawings includes a frame **10**. Frame **10** carries bearing housings **12** and **14**. Bearing housing **12** includes a turntable **16** which carries a plurality of upright bearing blocks **18** and which includes a depending pivot member or post **20**. Post **20** of turntable **16** is received within frame **10** and is journaled for rotative movement about its axis by bearing members **22**. Each bearing block **18** is preferably equiradially positioned about the axis of rotation of post **20** and carries a pair of arbors **24** and **26** which extend outwardly from the axis of rotation of the post. The number of bearing blocks **18** and therefore the number of pairs of arbors **24** and **26** carried by bearing housing **12** can vary, depending upon the size and application of the slitter. With regard to each pair of arbors, arbor **24** is positioned over arbor **26** and parallels arbor **26**. Each arbor **24** has one end **28** journaled within a bearing **30** carried by its associated bearing block **18** and each arbor **26** has one end **28** journaled within a bearing **32** carried by its associated bearing block. The arbors **24** and **26** of each pair of arbors are longitudinally slotted to receive a plurality of knives or cutters **34** and spacers **36** which are inserted over the opposite ends **38** of the arbors and which cooperate to define cutter assemblies **40**. The cutters **34** of each cutter assembly **40** are maintained in longitudinal alignment upon their respective arbor by a removable lock nut **42**.

Bearing housing **14** is spaced from bearing housing **12** and includes a bearing block **44**. Bearing block **44** includes slide bars **46** which rest upon surface **48** of frame **10** and which are retained within spaced guides **50** so as to enable block **44** to be shifted toward and away from bearing housing **12**. An actuator member **52**, such as a hydraulic or pneumatic piston and cylinder, is carried by frame **10** and includes an extendible-retractable actuator rod **54** which is connected to bearing block **44**. Upon activation, actuator member **52** will cause shiftable movement of bearing block **44** within guides **50**. When block **44** is shifted away from bearing housing **12**, as shown in FIG. **3**, bearing housing **12** may be rotated with arbors **24** and **26** clearing block **44**. Bearing block **44** carries bearings **56** and **58** which are positioned to journal ends **38** of each pair of arbors **24** and **26** as the arbors are brought into alignment with bearing housing **14** upon pivotal movement of bearing housing **12**. Bearing **56** includes a rotative sleeve **60** and bearing **58** includes a rotative sleeve **62**. End **38** of each arbor **24** has a slot **64** formed therein to interlock with a key **65** carried by sleeve **60**. End **38** of each arbor **26** has a slot **66** formed therein to interlock with a key **67** carried by sleeve **62**. With bearing block **44** shifted away from bearing housing **12**, bearing housing **12** can be rotated until a selected pair of arbors **24** and **26** is aligned with sleeves **60** and **62** of bearings **56** and **58**. The aligned arbors are then rotated to align slots **64** and **66** in the ends of the arbors with keys **65** and **67** in the sleeves. Actuator member **52** is then activated to urge bearing block **44** toward the

bearing housing 12, causing ends 38 of the aligned arbors to enter sleeves 60 and 62 and interlock therewith, as shown in FIG. 2, for rotation with the sleeves.

Bearings 30 and 56 which support ends 28 and 38 of arbor 24 are shiftably carried within slotted openings 68 in bearing blocks 18 and 44 so as to be movable up and down relative to bearings 32 and 58 which are fixedly positioned within their respective bearing blocks. Bearings 30 and 56 are retained within their respective bearing blocks by guide plates 70. A jackscrew assembly 72 is mounted to the top of each bearing block 18 and 44. Each jackscrew assembly 72 includes a vertically shiftable connector rod 74 which is connected to bearings 30 and 56 and which upon actuation of the jackscrew assembly causes the connected bearing to be raised or lowered within its bearing block. The jackscrew assembly 72 carried by bearing block 44 includes a drive shaft 76 which is connected at its outboard end to a drive motor 78 and which upon rotation causes the raising and lowering of rod 74. The inboard end of drive shaft 76 defines a female coupler portion 80 which is journaled within a suitable support 82. A shaft revolution counter 84 is operatively coupled to drive shaft 76.

Each jackscrew assembly 72 carried by a bearing block 18 includes a drive shaft 86 which is connected at one end to a cross-over shaft 88 and at the other end to a shaft revolution counter 90. Drive shaft 86, upon rotation, causes the raising and lowering of rod 74 of the jackscrew assembly. Each cross-over shaft 88 extends outwardly from the rotational axis of bearing housing 12 and is journaled within a suitable support 92. A male coupler portion 94 is formed at the free end of each shaft 88. As a selected pair of arbors 24 and 26 is aligned with bearings 56 and 58 carried in bearing housing 14 and bearing block 44 is shifted toward bearing housing 12 to couple ends 38 of the aligned arbors to sleeves 60 and 62, the male coupler portion 94 of the cross-over shaft 88 associated with the aligned pair of arbors connects with female coupler portion 80 of the jackscrew assembly carried by bearing block 44. With the aforementioned cross-over shaft 88 operatively interconnecting jackscrew assemblies 74 carried by bearing block 44 and one bearing block 18, drive motor 78 upon activation will cause the simultaneous actuation of the jackscrew assemblies and the raising or lowering, depending upon direction of rotation of the drive motor, of the arbor 24 supported between the bearing blocks. Revolution counters 84 and 90 serve to indicate the relative positions of the ends of arbor 24 as it is raised or lowered. Arbors 26 lie in a horizontal plane extending normally to the axis of rotation of bearing housing 12. It is to be understood that in some constructions of this invention, arbor 26 instead of or in conjunction with arbor 24 may be designed so as to be adjustable in position.

Gears 96 carried by bearing block 44 mesh with gears 98 carried by sleeves 60 and 62 so that upon rotation of one sleeve the other sleeve will be correspondingly rotated in the opposite direction for any operative position of sleeve 60. In some applications of the slitter of this invention only sleeve 62 may be power driven or neither sleeve need be power driven. A gear box 100 is mounted to frame 10 and includes an output shaft 102 which is slidably received within sleeve 62. Output shaft 102 has a slot 104 formed therein which receives key 67 carried by the sleeve so that rotative movement of the output shaft will cause rotative movement of sleeve 62 and a corresponding rotation of the arbor 26 when drive-connected to the sleeve. Shaft 102 and sleeve 62 remain in continuous driving engagement with the sleeve experiencing sliding movement over the output shaft upon shiftable movement of bearing block 44. Thus, as bearing block 44 is shifted by actuator member 52 away from bearing housing 12 so as to permit pivotal movement of bearing housing 14, sleeve 62 will be moved rearwardly upon shaft 102 toward gear box 100. Once a selected pair of arbors 24 and 26 are aligned with sleeves 60 and 62, actuator member 52 will be activated to cause bearing housing 44 to be shifted toward bearing housing 12 with the sleeve 62 moving forwardly over shaft 102 and over end 38 of the aligned arbor 26. The input shaft 106 of gear box 100 is operatively connected by suitable power transmitting gearing to shaft 102 and carries a sprocket 108 which is operatively connected by an endless drive chain 110 to a sprocket 112 connected to a transmission 114 located in the bottom of frame 10. A drive motor 116 is connected to transmission 114. Actuation of motor 116 causes the rotation of output shaft 102 which in turn causes the simultaneous rotation of sleeves 60 and 62 and a corresponding rotation of that pair of arbors 24 and 26 which is drive-connected to the sleeves.

The sheet material utilized in the slitting operation is carried upon a stock roll and is fed between the cutter assemblies 40 carried by that selected pair of arbors 24 and 26 supported between bearing housings 12 and 14. The slit sheet material as it emerges from between the cutter assemblies is wound upon a power driven take-up roller which serves to pull the material through the cutter assemblies. The power drive to the arbors serves to assist in the cutting operation and may include an overriding clutch which can be carried within gear box 100 to permit free running of the arbors should the speed of the take-up roll exceed that of the driven speed of the arbors. For thin sheet material, it may be desirable to utilize only the power drive to the arbors and, if necessary, a power drive to the stock roll to push the material through the cutter assemblies. In operation of the aforedescribed slitter, while one slitting operation is being completed, the user of the slitter can arrange the cutting assemblies on one of the other unused pairs of arbors 24 and 26 in preparation for the next slitting operation. When the current slitting operation has been completed and the preassembled cutter assemblies pivoted into operative position for the next slitter operation, the previously used cutter assemblies can be removed from their arbors and the arbors prepared, if desired, for still another succeeding slitter operation. Through this means, the downtime for the slitter is maintained at a minimum. Additionally, the size of one pair of arbors 24 and 26 may vary from the size of other pairs of arbors carried by bearing housing 12 so as to accommodate various thicknesses of sheet material and slitter requirements.

It is to be understood that the invention is not to be limited to the details herein given but may be modified within the scope of the appended claims.

What we claim is:

1. A slitter comprising a frame, first and second spaced housings carried by said frame, means pivotally connecting said first housing to said frame, said first housing carrying multiple spaced pairs of arbors, each pair of arbors connected at one end to said first housing, each arbor adapted to carry removable cutters, each pair or arbors being alignable with said second housing upon pivotal movement of said first housing, the other end of each pair of arbors being supported by said second housing when said arbors are aligned with said second housing, whereby said pairs of arbors so supported by said second bearing housing may be utilized for one slitting operation and simultaneously therewith another pair of arbors may be fitted with cutters for use in another subsequent slitting operation.

2. A slitter comprising a frame, first and second spaced bearing housings carried by said frame, means pivotally connecting said first bearing housing to said frame, said first bearing housing carrying multiple spaced pairs of arbors, each pair of arbors journaled at one end within said first bearing housing, each arbor adapted to carry removable cutters, said second bearing housing being shiftable toward and away from said first bearing housing, each pair of arbors being alignable with said second bearing housing upon pivotal movement of said first bearing housing, the other end of each pair of arbors being journaled within said second bearing housing when said arbors are aligned with the second bearing housing and said second bearing housing is shifted toward said first bearing housing, whereby said pairs of arbors so journaled within said second bearing housing may be utilized for one slitting operation and simultaneously therewith another pair of arbors may be fitted with cutters for use in subsequent slitting operation.

3. The slitter of claim 2 and drive means for rotating at least one of the arbors of each pair of arbors when journaled in said second bearing housing.

4. The slitter of claim 3 wherein said drive means includes parts carried by said second bearing housing making driving contact with said one arbor when journaled in said second bearing housing.

5. The slitter of claim 4 wherein said drive means includes a drive shaft carried by said frame, a sleeve journaled for rotation within said second bearing housing, means connecting said sleeve to said drive shaft for rotation with but permitting longitudinal movement relative to said drive shaft, means securing said sleeve to said second bearing housing for shiftable movement with said second bearing housing toward and away from said first bearing housing, said sleeve remaining in rotatable contact with said drive shaft during said shiftable movement of said second bearing housing, said one arbor being alignable with said sleeve upon pivotal movement of said first bearing housing and carrying means for connecting said one arbor to said sleeve for rotation with said drive shaft when said second bearing housing is shifted toward said first bearing housing.

6. The slitter of claim 5 and a second sleeve journaled for rotation within said second bearing housing, the other of the arbors of each pair of arbors being alignable with said second sleeve upon pivotal movement of said first bearing housing and carrying means for connecting said other arbor to said second sleeve, first gear means carried by said sleeves, second gear means in driving association with said first gear means for causing rotation of said second sleeve and connected other arbor upon rotation of said drive shaft.

* * * * *