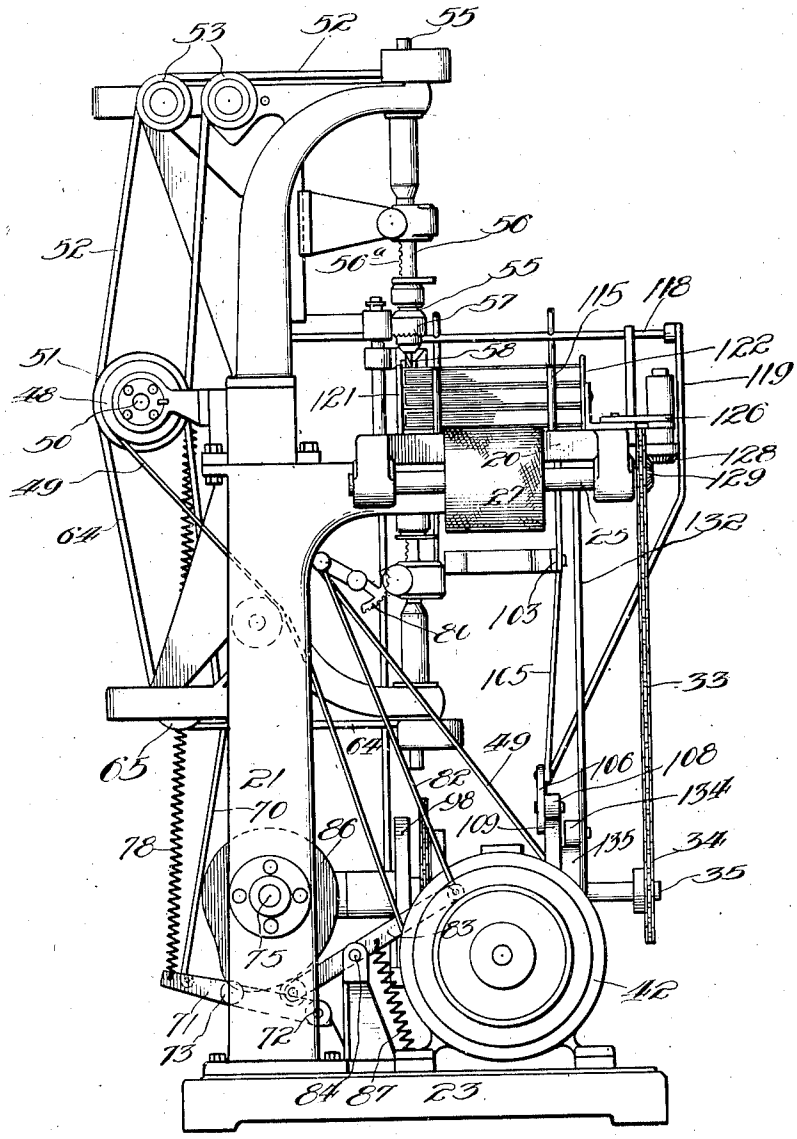
March 2, 1926. 1,575,308

H. C. ALGER ET AL

DRILLING MACHINE

Filed Nov. 12, 1923 8 Sheets-Sheet 1

Fig. 1.



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March 2, 1926. 1,575,308

H. C. ALGER ET AL

DRILLING MACHINE

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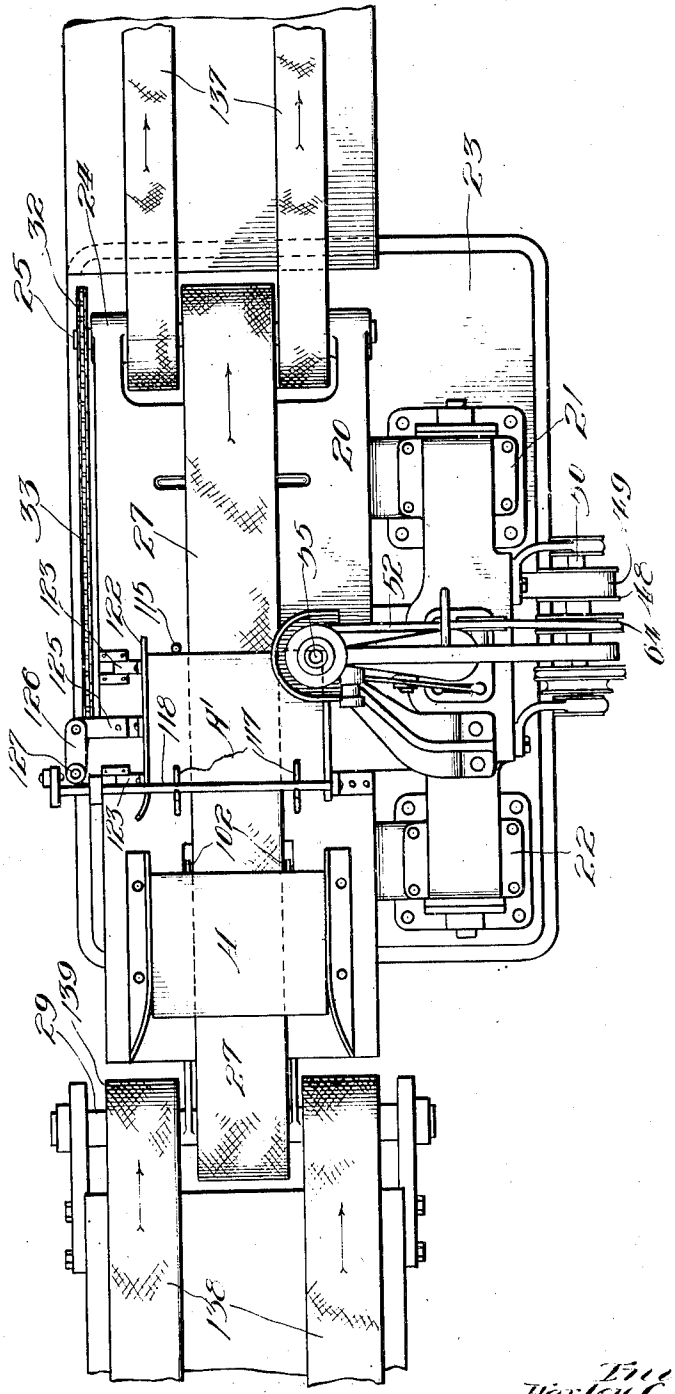


Fig. 2.

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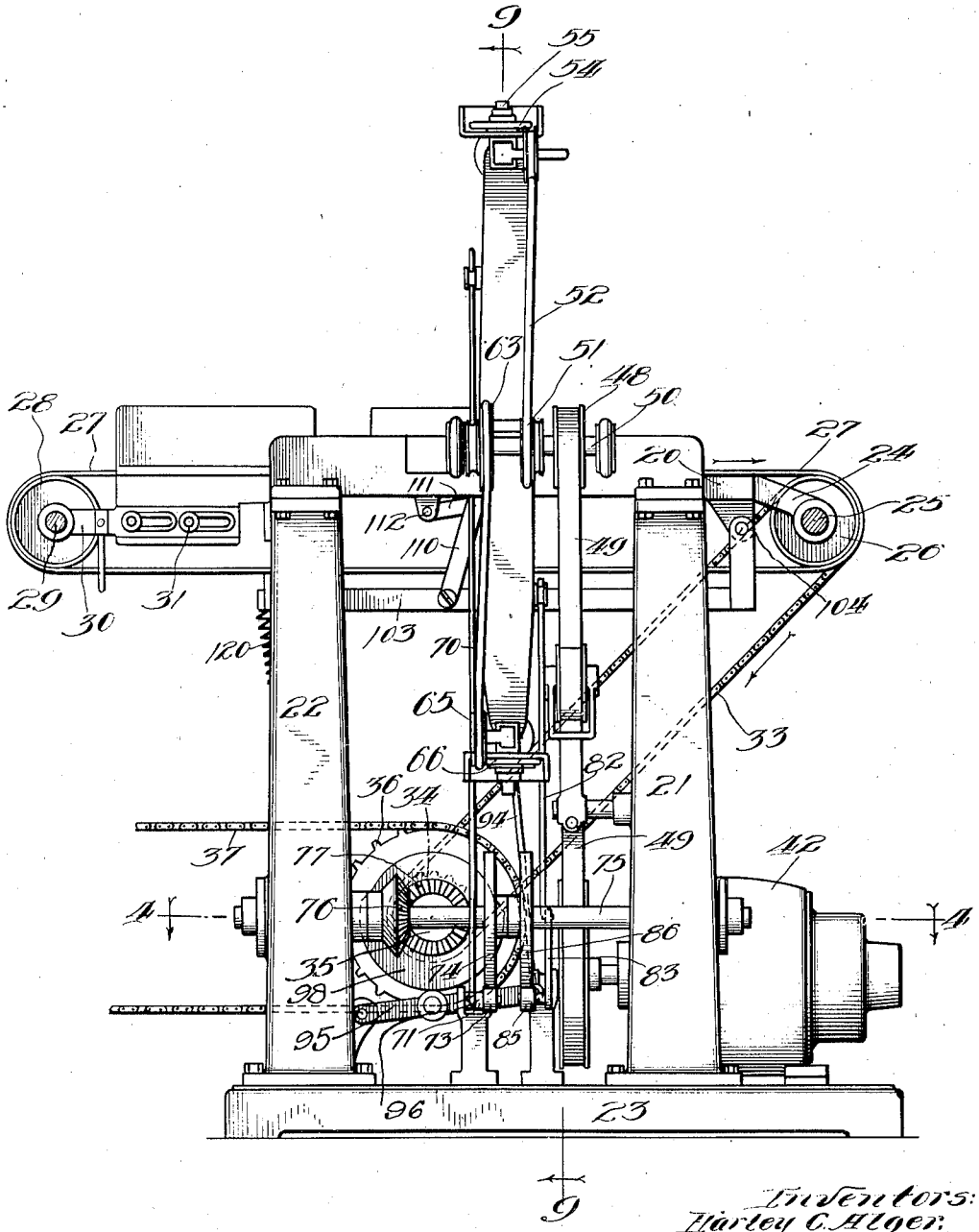
March 2, 1926. 1,575,308

H. C. ALGER ET AL

DRILLING MACHINE

Filed Nov. 12, 1923 8 Sheets-Sheet 3

Fig. 3.



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March 2, 1926. 1,575,308

H. C. ALGER ET AL

DRILLING MACHINE

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Fig. 4.

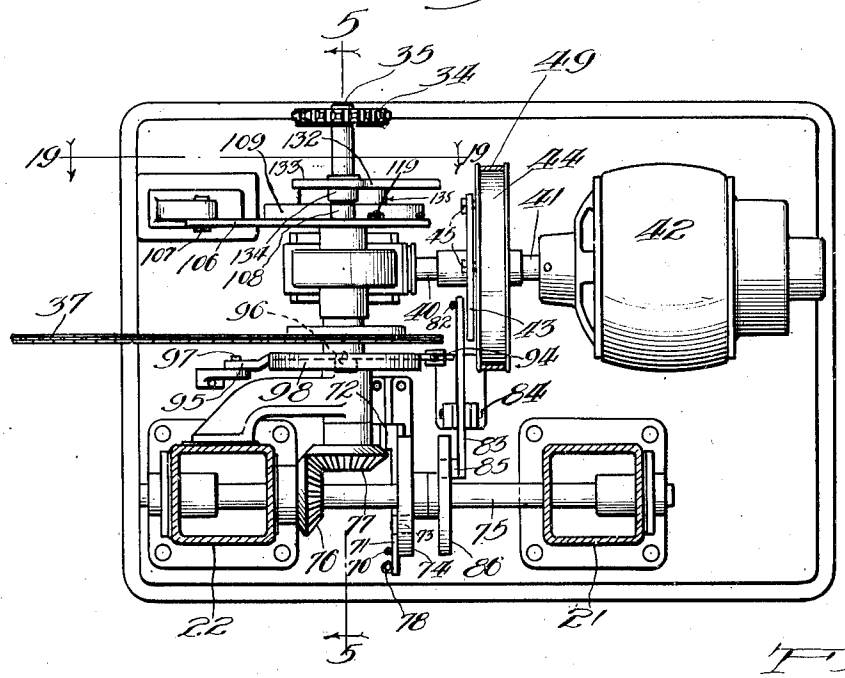


Fig. 5.

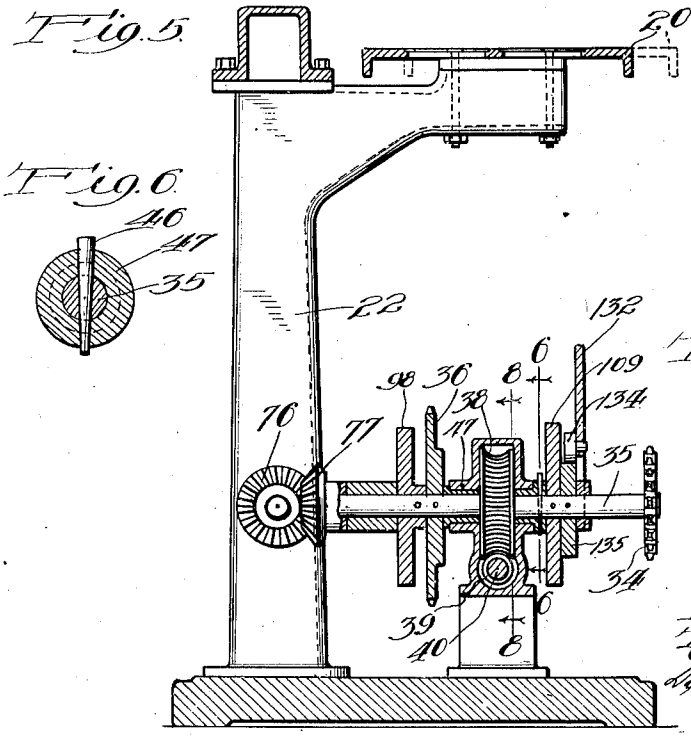


Fig. 6.

Fig. 7.

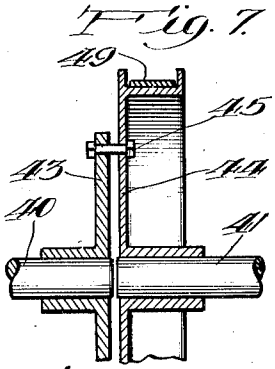
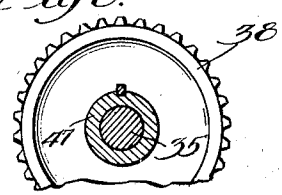


Fig. 8.



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March 2, 1926. 1,575,308

H. C. ALGER ET AL

DRILLING MACHINE

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Fig. 9.

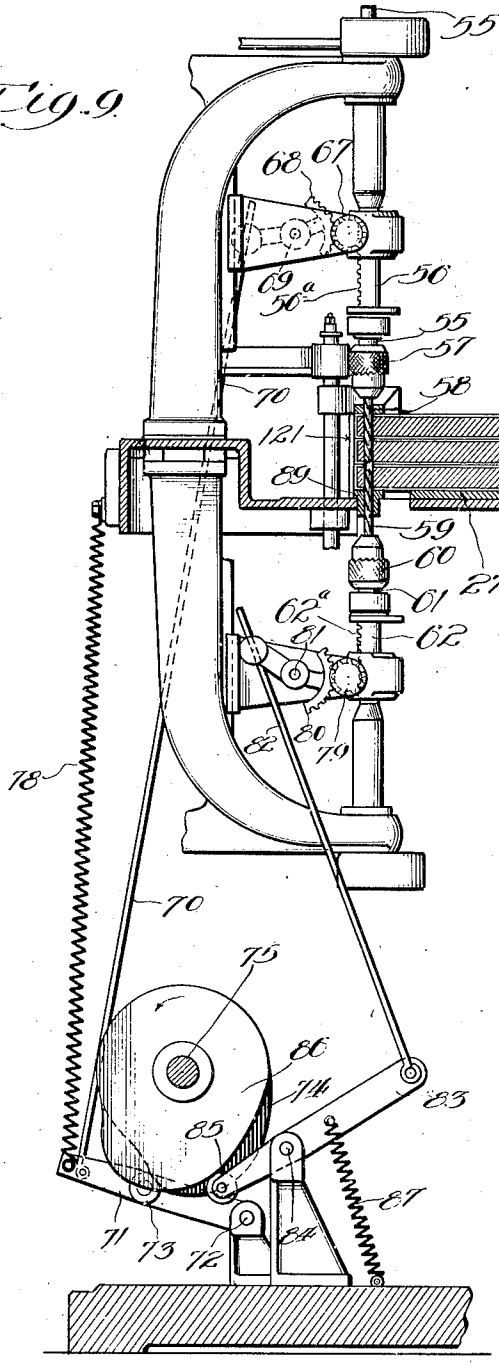


Fig. 10.

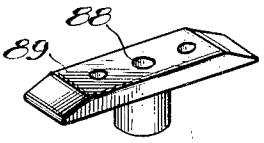
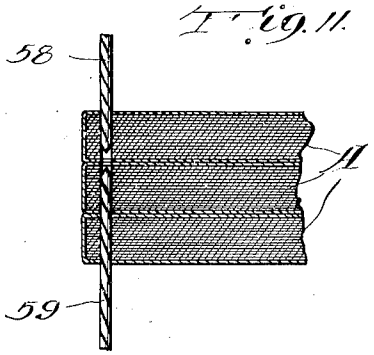


Fig. 11.



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March 2, 1926. 1,575,308

H. C. ALGER ET AL.

DRILLING MACHINE

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Fig. 12.

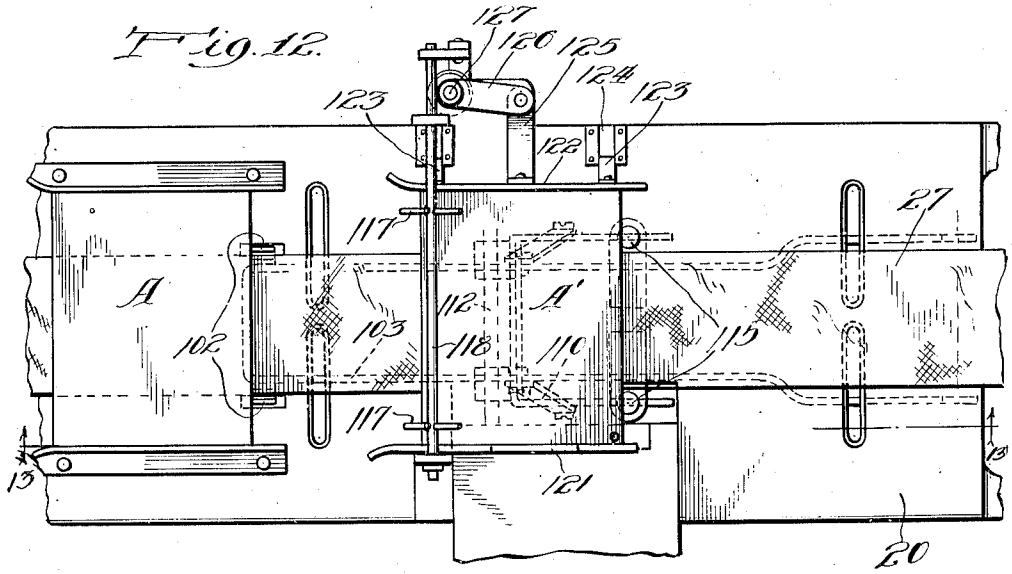


Fig. 13.

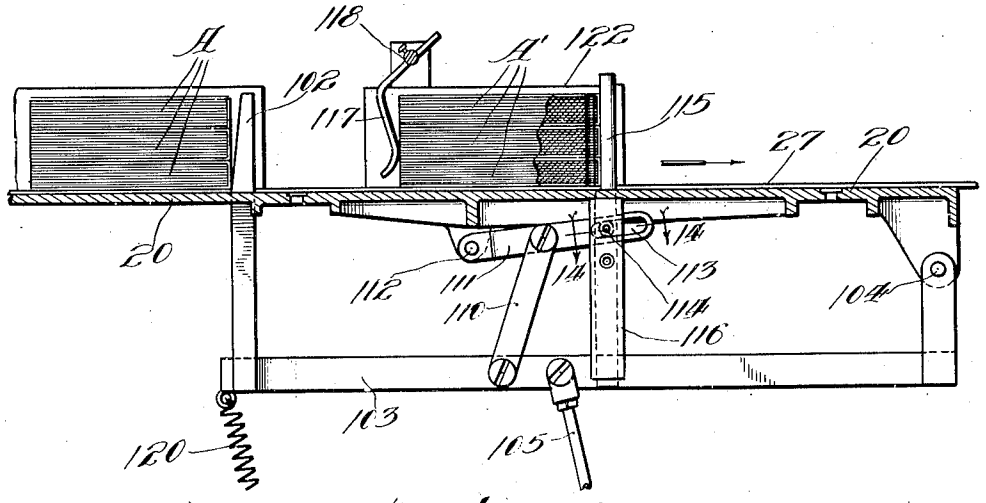
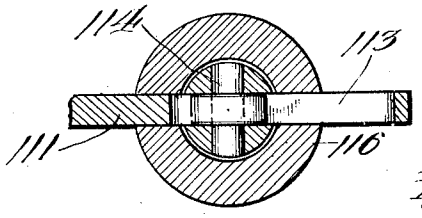


Fig. 14.



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March 2, 1926. 1,575,308

H. C. ALGER ET AL

DRILLING MACHINE

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Fig. 15.

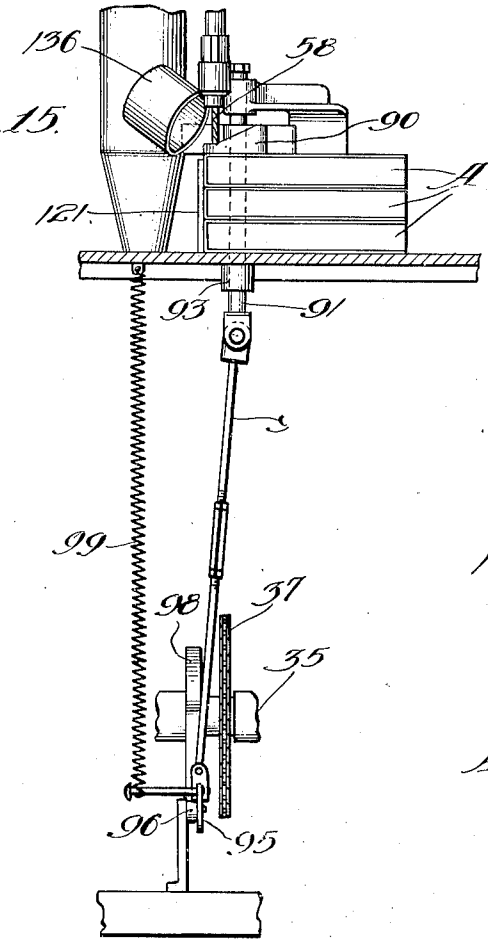


Fig. 16.

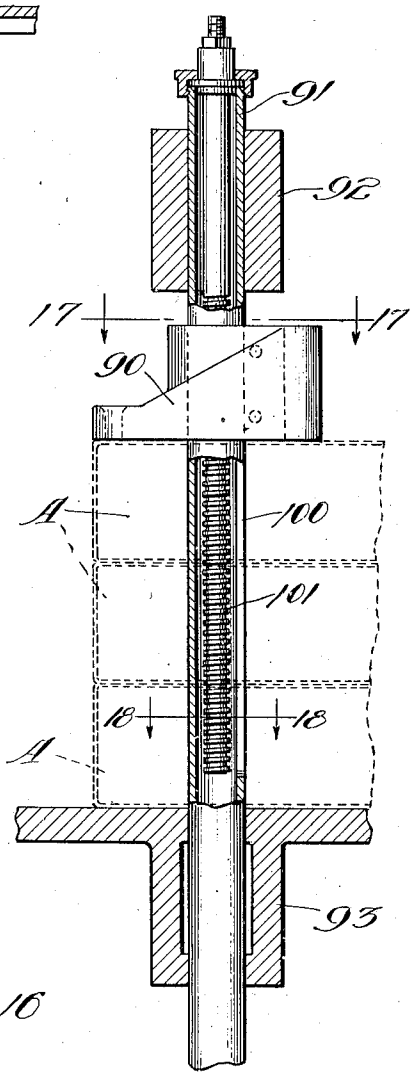


Fig. 17.

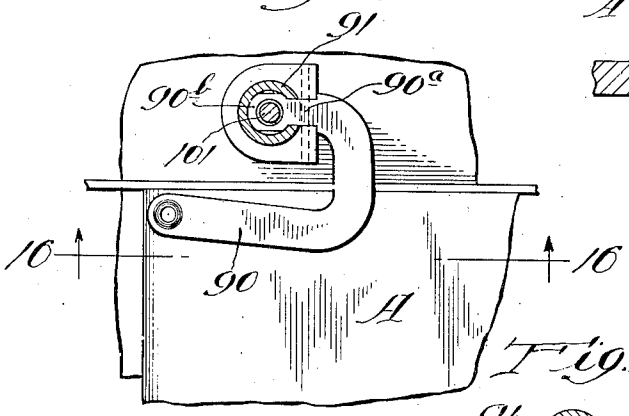


Fig. 18.



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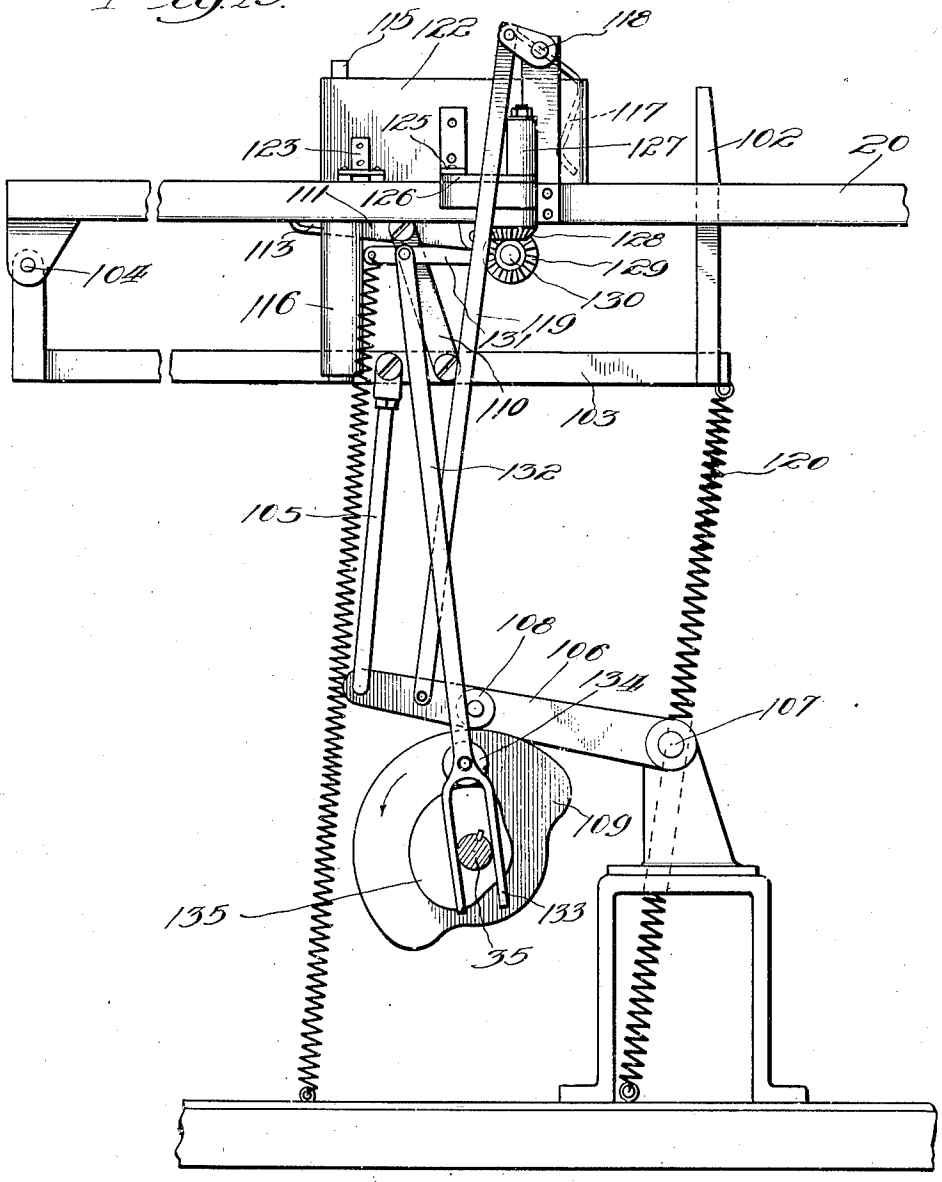
March 2, 1926. 1,575,308

H. C. ALGER ET AL

DRILLING MACHINE

Filed Nov. 12, 1923 8 Sheets-Sheet 8

Fig. 19.



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Patented Mar. 2, 1926. 1,575,308

UNITED STATES PATENT OFFICE.

HARLEY C. ALGER AND RAYMOND E. ACKLEY, OF CHICAGO, ILLINOIS, ASSIGNORS TO R. R. DONNELLEY & SONS COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

DRILLING MACHINE.

Application filed November 12, 1923. Serial No. 674,200.

To all whom it may concern:

Be it known that we, HARLEY C. ALGER and RAYMOND E. ACKLEY, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Drilling Machines, of which the following is a specification.

This invention relates to a machine for drilling holes in the corners of telephone books and the like so that a string may be inserted for suspending the book from a hook.

This machine will operate either as an independent machine under its own power, or in timed relation, to and operably connected with a trimming machine of the type usually called a Rowe trimmer and of the construction described in United States Letters Patent No. 1,003,679, granted to Thomas C. Welch, September 19, 1911.

It has been the practice hitherto to drill books on small independent machines, which are usually fed by hand, one book at a time, and the drill fed by a foot treadle. In order to provide a drilling capacity equal to the production of a Rowe trimmer, which trims and discharges from twenty to twenty-five piles of books per minute, it is necessary to provide several of these small machines each with an operator, and also several men to take books from the trimmer and distribute to the small drills.

It has also been the practice in drilling books to drill only from one side, usually the top, which not only limits the rate of production but makes it necessary to employ "cutting strips" or bars of wood or fibre into which the drill penetrates lightly at the end of its stroke in order to obtain a smooth hole at the point where the drill emerges from the book. These strips have to be frequently moved and a fresh surface presented to drill against.

An object of our invention is to provide a machine having a large productive capacity, and particularly one which will drill piles of books as they come from a trimming machine, at substantially the same rate of production.

Another object is to provide a machine which will receive, drill and discharge books or piles of books automatically.

Another object is to provide a machine which may be operated either as an entirely independent and self-contained machine, or may be connected to and driven from a trimming machine, in such a manner that books are discharged directly from the trimming machine into the drilling machine without the necessity of any intermediate handling.

A further object is to provide a drilling machine which will be readily adjustable for various sizes of books and heights of piles.

These and other objects are accomplished by our invention which is fully described in the following specification and shown in the accompanying drawings in which:

Figure 1 is an end elevation of a machine embodying the invention;

Fig. 2 is a plan view of the same;

Fig. 3 is a rear elevation;

Fig. 4 is a horizontal section on the line 4—4 of Fig. 3;

Fig. 5 is a vertical section on the line 5—5 of Fig. 4;

Fig. 6 is a section taken on the line 6—6 of Fig. 5;

Fig. 7 is an enlarged section through the motor pulley taken on the line 7—7 of Fig. 4;

Fig. 8 is a partial enlarged section on the line 8—8 of Fig. 5;

Fig. 9 is an enlarged section showing the machine in the operation of drilling books and near the completion of that operation;

Fig. 10 is an enlarged perspective of the drill plate which supports the books being drilled;

Fig. 11 is an enlarged partial section through the books showing the drills completing the drilling operation;

Fig. 12 is a plan view of the table of the machine;

Fig. 13 is a longitudinal section on the line 13—13 of Fig. 12;

Fig. 14 is an enlarged section on the line 14—14 of Fig. 13;

Fig. 15 is a partial section showing the mechanism for operating the foot which holds the work while being drilled;

Fig. 16 is an enlarged partial section for part of this mechanism;

Fig. 17 is a partial plan view on the line 17—17 of Fig. 16;

Fig. 18 is a horizontal section on the line 18 of Fig. 16; and

Fig. 19 is a partial section viewed on the line 19—19 of Fig. 4.

The invention as illustrated comprises a table 20 carried by supports 21 and 22 which are secured to a base 23. The table 20 has bearings 24 in which is journaled a shaft 25. This shaft carries a pulley 26 over which passes a belt 27 which passes horizontally over the top of the table 20 and around a pulley 28 which is carried by a shaft 29. This shaft is journaled in bearings 30 which are adjustably secured by means of cap screws 31.

The shaft 25 is driven by means of a sprocket keyed thereon, a chain 33 and a sprocket 34 which is keyed on a shaft 35 which is journaled in suitable bearings which is carried by the base 23 as shown in Figs. 4 and 5. This shaft may be driven from either of two sources (*a*) the sprocket 36 which is keyed thereon and which is driven by means of a chain 37 as shown in Fig. 3 from a sprocket on the Rowe trimmer as will later be explained or (*b*) by means of the worm wheel 38 which is keyed to the bushing 47 which may be pinned to the shaft 35, as will later be explained, and is driven by the worm 39 on the shaft 40 which is placed in axial alignment with the motor shaft 41 of the electric motor 42 as shown in Fig. 7.

When it is desired to drive the operating mechanism of the drilling machine from the electric motor, the flange 43 (see Fig. 7) is secured to the flange 44 of the belt pulley on the motor shaft 41 by means of one or more bolts 45. At the same time the chain 37 is removed from the sprocket 36 and can otherwise be operatively disconnected from the shaft of the Rowe trimmer which drives it.

In case it is desired to drive the drill operating mechanism from the trimmer so that the two will be in step, the drilling machine serving to drill each pile of books as it comes from the trimmer, the chain 37 is caused to operate the sprocket 36, and the bolts 45 are removed so as to permit the pulley 44 to turn independently on the flange 43 and the shaft 40. At the same time the pin 46 (Fig. 6) is removed from the bushing 47 which is keyed to the worm wheel 38 as shown in Fig. 8, so as to permit the worm wheel 38 to remain stationary while the shaft 35 is turned.

In either case the motor 42 is in operation and drives the pulley 48 by means of the belt 49. The pulley 48 is keyed to the shaft 50. This shaft carries a pulley 51 over which operates a round belt 52 which passes over idler sheaves 53 and around a sheave 54 of the drill spindle 55. The lower end of this drill spindle which is journaled in a vertically adjustable sleeve 56 carries a drill chuck 57 which is adapted to hold a drill 58 in axial alignment with the drill spindle 55. Similarly a drill 59 is held by the drill chuck 60 on the drill spindle 61, the drill 59 opposing the drill 58 and being in axial alignment therewith.

The spindle 61 is journaled in a vertically adjustable sleeve 62 which like the similar sleeve 56 is raised and lowered as will later be explained. The spindle 61 is driven by means of the sheave 63 (Fig. 3) and a round belt 64 which passes over the idler 65 and around the sheave 66.

For raising and lowering the upper drill 58, we have provided on the sleeve 56 a series of teeth forming a rack 56^a which are engaged by an idler pinion 67. This pinion is driven by a gear sector 68 which is pivotally mounted at 69, the gear sector being operated by means of a rod 70 which is pivotally connected by a lever 71 which is fulcrumed at 72. This lever carries a roller 73 which rides on the face of the cam 74, the cam being carried by a shaft 75 which is journaled in suitable bearings in the supports 21 and 22, and which is driven by means of bevel gears 76, and a bevel gear 77 on the shaft 35. As the shaft 75 revolves the cam follower 73 which is held against the cam 74 by means of the tension spring 78 follows the cam 74 and causes the sleeve 56 to be raised and lowered while the drill 58 is driven at high speed as has been previously explained.

At the same time the sleeve 62 is raised and lowered by a similar mechanism by a sleeve 62 having a rack 62^a formed thereon which engages an idler pinion 79 which in turn meshes with the gear sector 80 which is pivotally mounted on a pin 81, the opposite end of the sector being connected through the rod 82 with the lever arm 83 which is fulcrumed at 84. The end of this lever arm carries a cam follower 85 which is held against the cam 86 by means of a spring 87.

These cams are so timed as to cause the drills 58 and 59 to be withheld from the path of the books during the time these piles are being moved into drilling position as will later be explained. As the cams 74 and 86 operate to cause the drills to approach each other, the drill 58 is advanced more rapidly than the drill 59 and having reached a maximum depth is withdrawn while the drill 59 follows it so that the end of the drill 59 enters the hole previously made by the drill 58, thus insuring that the hole will be drilled through the books. This is shown in the position of the drills

in Figs. 9 and 11. The lower drill 58 passes up through the hole 88 in the drill plate 89 (Fig. 10) which is carried by the drill table, the top of this plate being substantially on a level with the top of the belt 27.

The books are held in place, as shown in Figs. 15, 16 and 17, by means of a foot 90 which overlies the drill plate 89, which foot it will be noted, will not bear upon that portion of the pile of books overlying the belt 27. This foot is adjustably carried upn a hollow tube 91 which is slidably mounted in guideways 92 and 92. The lower end of this tube is pivotally connected by rods 94 with a cam follower by lever 95 upon which is pivotally mounted a cam follower 96. The end of the lever 95 is fulcrumed at 97. The cam follower 96 is held in contact with the cam 98 by means of a spring 99 so that during a portion of each revolution of the cam 98 which is keyed to the shaft 35, the foot 90 is firmly pressed upon the top of the pile of books A. This is so timed that the foot is pressed down during the time the drills are passing through the books as has been previously explained.

Referring to Fig. 17, it will be observed that the foot 90 has a narrow portion 90^a which passes through a slot 100 in the tube 91 and the enlarged inner portion 90^b is threaded to receive the screw 101 which is secured to the tube 91. By means of this screw the height of the foot 90 may be nicely adjusted.

The books as viewed in Figs. 12 and 13 have a tendency to move from left to right because of the belt 27. As the books are carried on the table 20 the pile A encounters the stops 102 which are carried by the U-shaped bar 103 at its U which are hingedly secured at 104. A link 105 is pivotally connected near the center of the bar 103, the opposite end being pivotally connected to the lever 106 (Fig. 19) which is fulcrumed at 107. This lever carries a cam follower 108 which rolls upon the face of the cam 109 which is keyed to the shaft 35. The U-bar 103 also carries a link 110 which is pivotally connected to a lever 111, the latter being fulcrumed at 112. The outer end of the lever 111 has a slot 113 adapted to receive a pin 114 carried by a rod 115 which is slidable in a guide 116. One of these guides is placed at each side of the belt 27 and serves to stop the books at A′ where they are in position to be drilled. The motion of the cam is such as to permit the books A and A′ (Fig 3) to move forward when the stops 102 and 115 are withdrawn within the table on the continuously traveling belt 27, the stops again rising as the pile of books pass over the stop against which it is now resting, the pile A being then stopped at the position A′ and a new pile of books which has been fed to the belt 27 is then brought to the position A when it is brought to rest by the stop 102.

At the same time the books A′ are pressed against the stops 115 by fingers 117 which are mounted on the shaft 118 which is rotated by the rod 119 which is connected to the lever 106. The spring 120 holds the shaft 108 against the face of the cam 109.

In order to insure that the books A′ will be held squarely against the end guide 121, we have provided a movable plate 122 which is held by blocks 123 which lie in guide grooves 124. This plate has an arm 125 which is pivotally mounted by a lever 126 which is carried by a shaft 127. This shaft (Fig. 19) has a bevel gear 128. This gear meshing with a bevel 129 which is carried by a shaft 130, this shaft having a lever 131 is connected to a rod 132 the opposite end of which is bifurcated at 133, the bifurcated ends straddling the shaft and being guided thereon. The rod 132 carries a roller 134 which rides on the face of the cam 135 which is keyed to the shaft 35. It will be understood from the foregoing that as the shaft 35 rotates the lever 131 will be moved up in the position shown in Fig. 19, thereby causing the movable plate 122 to impress the pile of books A′ against the guide 121. The foot 90 is then pressed down upon the pile of books A′ firmly holding them in position while the drills 58 and 59 pass through them as has been previously explained. An exhaust pipe 136 placed near the drill 58 removes the smoke and dust which is caused by the high speed drill passing rapidly through the pile of paper books. The drills are then withdrawn, the foot 90 raised, the stops 102 and 115 lowered thereby permitting the books to move forward until the pile A now held by the stop 102 is held against and brought to rest by the stop 115, when the cycle of operation is repeated. The pile of books A′ released by the stops 115 are carried forward by the belt 27 until they are picked up by the twin belts 137 (Fig. 2) which convey them to the distributing table.

In Fig. 2 is also shown at the left end of the figure a Rowe trimmer having twin belts 138 which pass over pulleys 139 on the shaft 29. In this way and by driving the shaft 35 by means of a chain 37 from a sprocket on the Rowe trimmer as has been previously explained, the drilling mechanism is placed in step with the cutting operation with the Rowe trimmer so that the books will pass through from the Rowe trimmer to the drilling mechanism and be automatically drilled as has been explained herein and will pass on to the distributing table, all without the assistance of a human hand.

While we have shown and described cer-

tain embodiments of the invention, it is to be understood that it is capable of many modifications. Changes therefore in the construction and arrangement may be made without departing from the spirit and scope of the invention as disclosed in the appended claims, in which it is our intention to claim all novelty inherent in our invention as broadly as possible in view of the prior art.

We claim:

1. In a drilling machine, the combination of a continuously moving conveyor having a substantially flat surface adapted to carry objects resting thereon, means for interrupting the motion of and holding stationary an object resting thereon while the conveyor slips beneath said object, a drill, and means for feeding said drill into said object and withdrawing said drill while said object is held stationary, said interrupting and holding means releasing the object after said drill is withdrawn so that the object is again free to move with the conveyor.

2. In a drilling machine, the combination of a continuously moving conveyor having a substantially flat surface adapted to carry objects resting thereon, means for interrupting the motion of and holding stationary an object resting thereon while the conveyor slips beneath said object, a drill, means for feeding said drill into said object and withdrawing said drill while said object is held statonary, said interrupting and holding means releasing the object after said drill is withdrawn so that the object is again free to move with the conveyor, said object overhanging the edge of said conveyor, and a clamp adjacent said drill and at one side of said conveyor, said clamp being operative to hold said object during the drilling operation.

3. In a drilling machine, the combination of a continuously moving conveyor having a substantially flat surface adapted to carry objects resting thereon, means for interrupting the motion of and holding stationary an object resting thereon while the conveyor slips beneath said object, a drill, means for feeding said drill into said object and withdrawing said drill while said object is held statonary, said interrupting and holdng means releasing the object after said drill is withdrawn so that the object is again free to move with the conveyor, said object overhanging the edge of said conveyor, a clamp adjacent said drill and at one side of said conveyor, said clamp being operative to hold said object during the drilling operation, and means for operating the several before mentioned means, and said clamp in timed relation to each other.

4. In a drilling machine, the combination of a continuously moving conveyor having a substantially flat surface adapted to carry objects resting thereon, means for interrupting the motion of and holding stationary an object resting thereon while the conveyor slips beneath said object, a drill, means for feeding said drill into said object and withdrawing said drill while said object is held stationary, said interrupting and holding means releasing the object after said drill is withdrawn so that the object is again free to move with the conveyor, said object overhanging the edge of said conveyor, a clamp adjacent said drill and at one side of said conveyor, said clamp being operative to hold said object during the drilling operation, and continuously driven cams for operating the several before mentioned means, said drill, and said clamp in timed relation to each other.

5. In a drilling machine, a continuously moving conveyor, stops adapted to bemoved into and out of the path of an object carried by said conveyor, means adapted to grip a portion of said object overhanging an edge of the conveyor while held by said stops, continuously driven drills in axial alignment, one above and one below said object, cam means for forcing said drills into said object, and means for operating said stops, said gripping means and said cam means in timed relation to each other.

6. In a drilling machine, a continuously moving conveyor, stops spaced apart along said conveyor and movable into and out of the path of objects carried by the conveyor in timed relation to each other so that an object released by the first stop is held by the second, means adapted to grip a portion of said object overhanging an edge of the conveyor while held by said stops, continuously driven drills in axial alignment, one above and one below said object, cam means for forcing said drills into said object, and means for operating said stops, said gripping means and said cam means in timed relation to each other.

7. In a drilling machine, a continuously moving conveyor, stops spaced apart along said conveyor and movable into and out of the path of objects carried by the conveyor in timed relation to each other so that an object released by the first stop is held by the second, means for accurately positioning said object, means adapted to grip a portion of said object overhanging an edge of the conveyor while held by said stops, continuously driven drills in axial alignment, one above and one below said object, cam means for forcing said drills into said object, and means for operating said stops, said gripping means and said cam means in timed relation to each other.

8. In combination, a machine for drilling piles of books, a conveyor for feeding piles of books to the machine, said machine having mechanism for holding said piles of

books, and means for drilling said piles of books while so held, said mechanism and said means being operated at regular intervals and in timed relation to each other.

9. In combination a machine for drilling piles of books, means for feeding piles of books to said machine, said machine having mechanism for holding said piles of books, and means for drilling said piles of books while so held, said mechanism and said drilling means being operated in timed relation to each other.

10. In a drilling machine, the combination of a continuously moving conveyor having a substantially flat surface adapted to carry objects resting thereon, means for interrupting the motion of and holding stationary an object resting thereon while the conveyor slips beneath said object, a drill, means adjacent to the drill for clamping said objects in position while being drilled.

11. In a drilling machine, the combination of a continuously moving conveyor having a substantially flat surface adapted to carry objects resting thereon, means for interrupting the motion of and holding stationary an object resting thereon while the conveyor slips beneath said object, a drill, means adjacent to the drill for clamping said object in position while being drilled, said gripping means having means for guiding said drills.

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