Feb. 1, 1927. 1,615,966

H. R. STRAIGHT

TILE CUTTER

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Fig. 5.

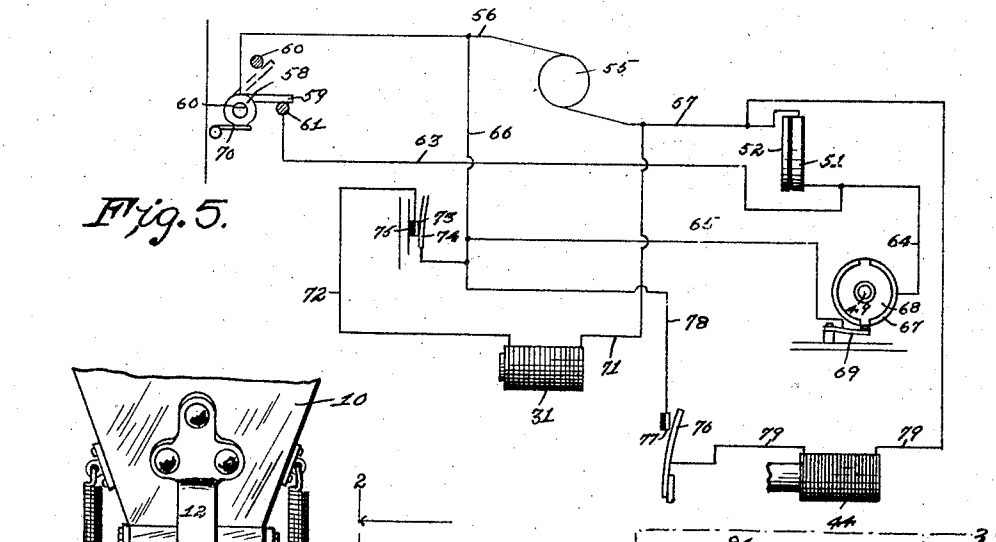
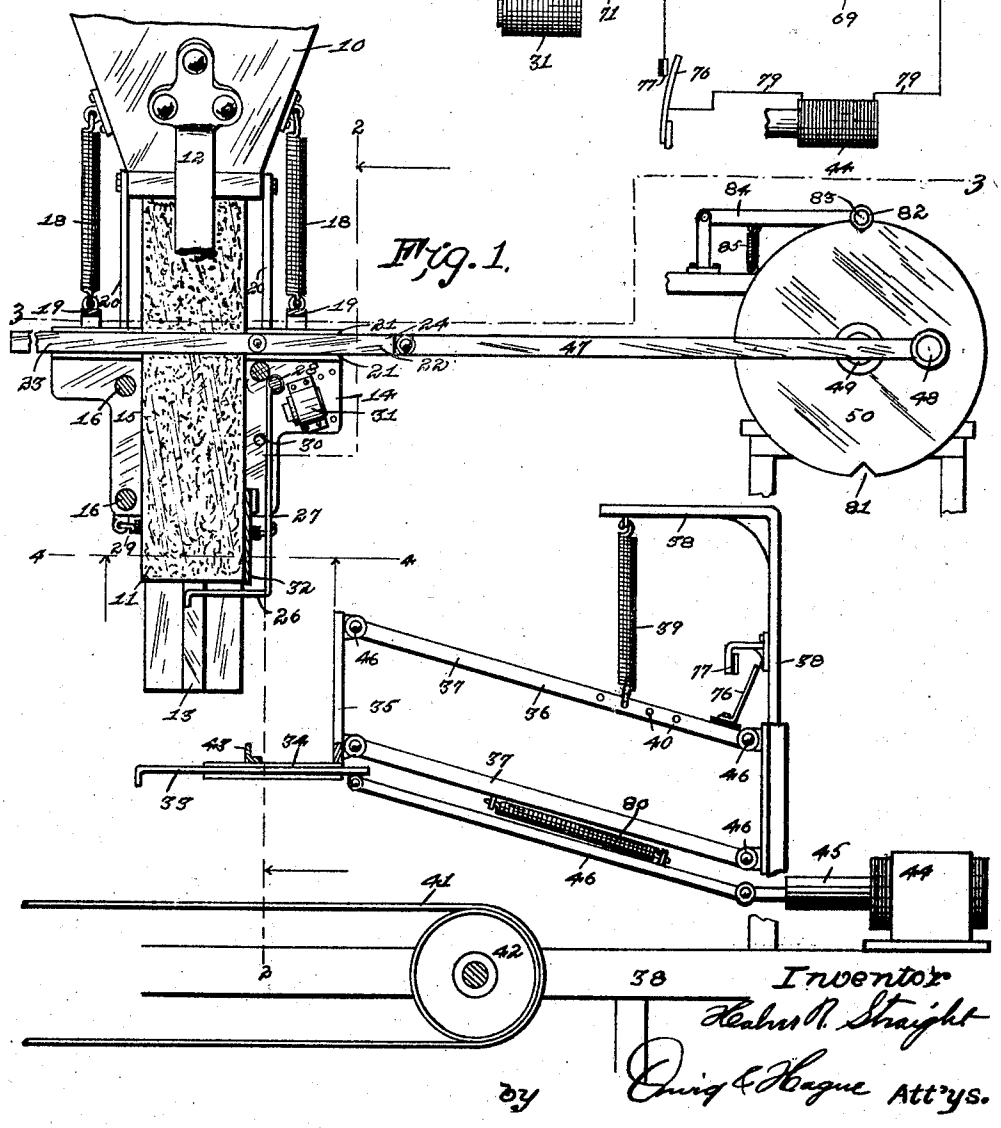


Fig. 1.



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Fig. 2.

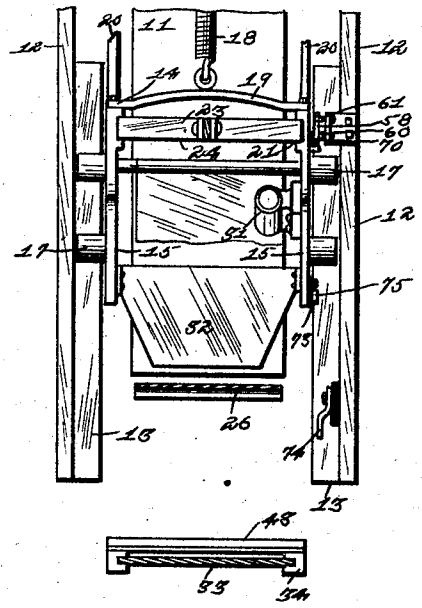


Fig. 4.

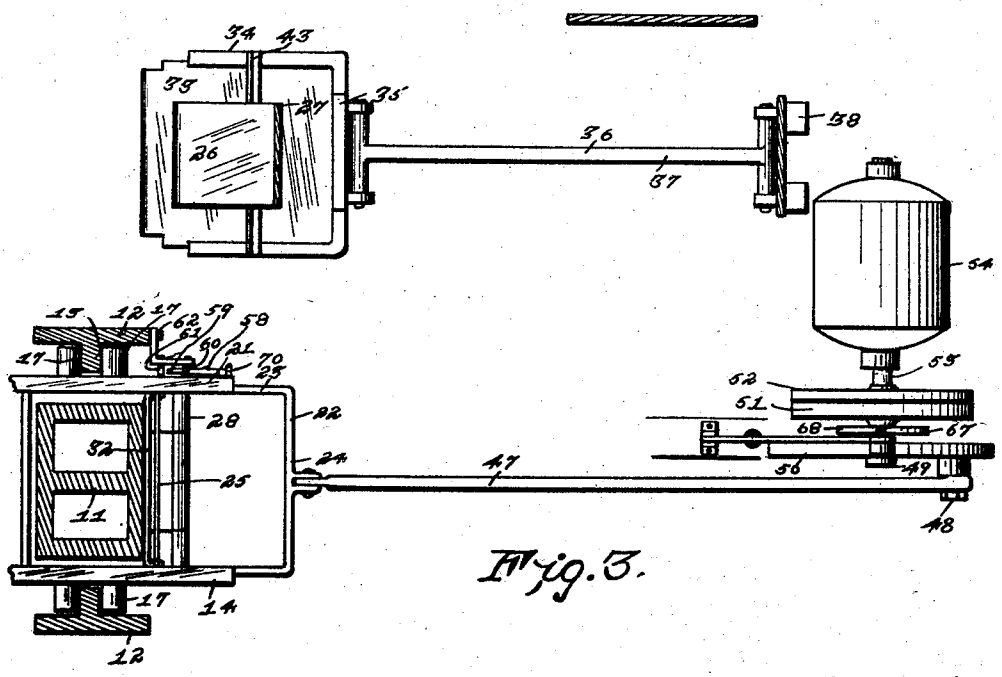


Fig. 3.

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UNITED STATES PATENT OFFICE.

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TILE CUTTER.

Application filed September 25, 1923. Serial No. 664,712.

This invention relates to improvements in machinery used in clay working industries, and particularly that type of a machine known as a tile cutter which is for the purpose of severing the continuously moving column of plastic clay into short sections commonly known as brick or tile. Heretofore it has been the practice to place the tile machine in such position that the continuously moving columns travel in a horizontal plane, in which position the column is severed into short lengths to form the tile. It is necessary after the tile has been cut to place them on a conveyor or similar device in a vertical position rather than in a horizontal position, for the reason that the tile go through the drier in better condition arranged vertically. The general practice is to change the tile from the horizontal to the vertical position manually. Numerous attempts have been made to provide automatic machinery for this purpose, as the labor involved is very excessive. As far as I am aware none of these off-bearing mechanisms have been altogether practical.

It is the object of my invention to provide new and improved means whereby this objection may be overcome by arranging the tile machine in such position that the vertical column of plastic material will be so positioned that it will move downwardly in a vertical plane, and provide means for severing the column while in the vertical position into tile, and provide mechanism for automatically lowering the tile onto a conveyor or receiving member beneath the said conveyor.

My invention consists in the construction, arrangement and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings in which:

Figure 1 is a side elevation of my improved mechanism with a portion of the cutter carriage broken away.

Figure 2 is a detail sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a detail sectional view taken on the line 3—3 of Figure 1.

Figure 4 is a detail sectional view taken on the line 4—4 of Figure 1.

Figure 5 is a wiring diagram of the electrical devices used in connection with the operating of my improved mechanism.

The numeral 10 indicates the discharge end of the tile machine which is mounted in such position that a column 11 of plastic material will be fed downwardly in a vertical plane. The means for supporting the tile machine is not shown as this forms no part of my present invention, said tile machine being of the ordinary construction.

The member 10 is provided with two vertically arranged guides 12 arranged on opposite sides of said member and extended downwardly. Each of said guides 12 is provided with an inwardly extending flange 13 to form a track for guiding what I shall term the cutter carriage 14. This carriage comprises two side plates 15 spaced apart and connected by frame members 16, each of the side plates 15 is provided with outwardly extending rollers 17 designed to travel on the guide members 13. The plates 15 are spaced apart such a distance that the column of plastic material 11 will freely pass between them, as clearly shown in Figure 3.

The carriage 14 is yieldably supported by means of springs 18, the upper end of each of which is secured to the member 10, and the lower ends to cross bars 19. The said cross bars are mounted in the upper end of the plates 15. The springs 18 are of such tension as to a little more than balance the weight of the carriage together with the mechanism which it carries, and to return the same to its upper limit of movement, the upper limit of its movement being stopped by bars 20 extending downwardly from the member 10.

The upper edge of each of the plates 16 is provided with a pair of inwardly extending flanges 21 designed to form a guide for horizontally supporting a cutter frame 22 so that the frame is free to move in said guides in either direction. The frame 22 is clearly shown in Figures 2 and 3. It will be noted that the frame 22 is formed open and designed to surround a column of plastic material and to have a stroke of a length greater than the width of the tile.

The said frame 22 is provided with side members 23 and end members 24. The side members travel in the tracks formed by the flanges 21. The side members 23 are designed to support a cutting wire 25 placed midway between their ends and extending from one to the other, and so arranged that when the frame 22 is moved in the guides, the cutting wires 25 will be passed through

the column of plastic material, thereby severing the same into tile.

For moving the cutter carriage downwardly I have provided a primary supporting plate 26 provided with upwardly extending portion 27, the upper end of which is pivoted to a shaft 28 mounted in the plates 14. The said pivot member is so mounted that the plate 26 will swing beneath the lower end of the tile by means of a spring 29 with the plate 27 against a stop pin 30 leaving the plate 26 in a horizontal position where it will engage the lower end of the tile. This will cause the cutter carriage 14 to travel downwardly against the action of the springs 18. When the carriage has moved downwardly a predetermined distance, the plate 26 will be moved from beneath the lower end of the tile by means of an electromagnet 31 located on one of the plates 15 and in such relation with the member 27 that the said member will act as an armature and be swung outwardly toward the magnet 31, causing the plate 26 to be pulled out from under the lower end of the tile.

A plate 32 is provided for preventing the tile from following the plate 26, as the plate 26 is drawn from under the tile. The tile will then be carried by a secondary supporting plate 33 slidably mounted in horizontal guide members 34. The guide members 34 are supported by means of a frame 35 forming a portion of a pantograph mechanism 36 which comprises parallel supporting arms 37, one end of each of which is pivoted to the frame 35 and have their opposite ends pivotally connected to a rigid supporting frame 38. The free ends of the pantograph are yieldably held outwardly by means of a spring 39, one end of which is supported by the frame 38.

When the tile engages the plate 33, its weight will cause the free end of the pantograph to descend quite rapidly, the speed of which may be adjusted by varying the supporting point of the spring 39 relative to the member 36. This adjustment may be accomplished by placing the lower end of the spring 39 in one of the number of openings 40 together with a proper size spring, the adjustment being necessary to accommodate tile of different sizes and weights. The spring 39 should be of such tension that the tile while resting on the plate 34 will travel several times the speed of the plastic column, so that the tile may be delivered to the conveyor 41 which is arranged horizontally beneath the tile, and the various mechanisms returned to their original position of movement in time to catch the next tile. The conveyor 41 is usually constructed preferably of the belt type and mounted on rollers 42 supported in the main frame 38.

Just before the plate 33 reaches the conveyor 41, it is slid from beneath the lower end of the tile by being drawn to the right, as shown in Figure 1. An angle iron 43 serves to strip the tile from the plate, said angle being secured rigidly to the guide 34.

The plate 33 is actuated by means of an electromagnet 44 having a slidable core 45 provided with a link 46 which has its free end connected to the plate 33. The pivot centers of the links 46 are in alinement with the center of the pantograph 36 when in its normal position. The member 46 is designed to rest parallel with the members 36 so that the plate 33 may be moved upwardly and downwardly without traveling in its guides.

The mechanism described is operated as follows:

The frame 22 is provided with a link 47, the free end of which is connected to a crank 48 of a crank shaft 49 mounted in suitable bearings on the main frame 38. The crank 48 is mounted in a disk 50. The shaft 49 is provided with one member 51 of an electromagnet clutch device and another member 52 mounted on a motor shaft 53 of a motor 54. The shaft 49 is in alinement with the shaft 53 and so arranged that as the clutch members 51 and 52 are magnetized, the shafts 53 and 49 will work in unison.

The said magnets and motors are included in an electric circuit illustrated in Figure 5, and in which is included a generator 55 provided with conductors 56 and 57. The conductor 56 includes a switch 58 comprising a switch member 59 pivoted to a pin 60. The said pin 60 is mounted on the outer surface of one of the side plates 15, shown in Figure 3.

The member 59 is designed to make contact with a pin 61 supported by an angle plate 62 from the frame member 12 when the cutter carriage starts to travel downwardly. The pin 61 is provided with a conductor 63 extending to the clutch member 51, while the conductor 57 is also connected with the said clutch member, establishing a current through said clutch and causing the shafts 53 and 49 to operate in unison, it being assumed that the motor 54 is running continuously.

The said switch 58 is shunted by a circuit comprising conductors 64 and 65 and 66. The said shunt circuit includes a divided slip ring 67 mounted on the shaft 49. The slip ring is mounted on an insulating disk 68 and made to make contact with a conductor 64, while the conductor 65 is connected to a contact member 69.

When the shaft 49 is started to rotate, the said contact 59 makes connection with one of the slip rings 67 and establishes a circuit through the shunt, at which time the member 59 disengages the pin 61 as the downward movement of the carriage continues.

The member 59 is supported in the position shown in dotted lines and held in said inclined position by means of a spring 70. The shaft 49 will continue to rotate until it has made one-half revolution, at which time the contact 69 disengages the slip ring 67 and rests on the insulating block between its ends, breaking the circuit and releasing the clutch. The crank 48 having moved one-half revolution will cause the frame 23 to be moved in one direction, and the wire 25 to have passed through the column of plastic material. The wire 25 rests at this point on the opposite side of the column until the next downward movement of the carriage, at which time the wire will be drawn in the opposite direction, thus cuting loose a second tile.

When the carriage 14 is moved downwardly to a point where the plate 26 is slightly above the plate 33, the magnet 31 will be energized, which is included in the circuit formed by the conductors 71, 72 and 66. The conductor 72 includes a switch 73 comprising contact members 74 and 75.

The contact 74 is mounted on one of the frame members 12, and the contact 75 is mounted on one of the plates 15, as clearly shown in Figure 2. The contact 75 is moved into engagement with the member 74 just at the time to cause the primary plate 26 to be pulled out from under the lower end of the tile which it supports. As soon as the said plate has been actuated, the cutter carriage will be relieved of its weight and the springs 18 will return it to its normal position of movement, at the same time causing the contacts 74 and 75 to disengage. The plate 26 will be returned to its normal position of movement by means of the spring 29.

When the tile has been released from the plate 26 it will fall on the plate 33, causing the free end of the pantograph mechanism to lower until the plate 33 is just above the conveyor 14, at which time a contact member 76 will engage the contact member 77.

The contact 76 is supported by the upper one of the arms 36, while the contact 77 is supported by the frame member 38, as clearly shown in Figure 1. The contacts 76 and 77 are in a circuit which includes conductors 78 and 79. The conductor 78 is connected to the conductor 66 and the conductor 79 having included the magnet 44. The conductor 79 is connected to the conductor 57.

By this arrangement it will be seen that as the contact 76 engages the contact 77, a circuit will be established through the magnet 44, causing the plunger 45 to be moved longitudinally, and the plate 34 to be drawn out from under the lower end of the tile by means of the connecting rod 46, the member 43 serving to strip the tile from the plate 33. When this takes place, the tile will then rest on the conveyor 41 and the plate 33 will be moved to its upper limit of movement with the spring 39, breaking the contacts 76 and 77. The said plate is returned to its normal position of movement by means of a spring 80.

The fixed pivot members of the pantograph arms 36 are preferably placed lower than the normal position of the plate 33 so that as the plate 33 is permitted to lower, it will be swung laterally in a direction with the travel of the upper end of the conveyor 41. This imparts a certain amount of lateral forward movement to the block before the said block engages the conveyor 41, and imparts a certain forward momentum thereto so that the block will not be upset through its inertia as it engages the said conveyor.

For retaining the crank 48 in its two normal positions of movement against any tendency toward rotation due to the weight of the connecting rod 47, I have provided in the periphery of the disk 50 two notches 81 and 82 which are designed to be engaged by a spring actuated roller 83 supported on a pivot arm 84, said arm being held downwardly by means of a spring 85, with the roller 83 in the upper one of the notches 82 when the crank is in its normal position.

Thus it will be seen that I have provided a tile cutter of simple, durable and inexpensive construction which is adapted to operate rapidly and efficiently, and one which will place the tile in an upright position on the horizontal conveyor, and which is adapted to sever the tile from a continuously moving vertically arranged column of plastic material, and to automatically deliver them to the said conveyor.

I claim as my invention:

1. The combination of a tile machine arranged to deliver a continuously moving column of plastic material downwardly and in a vertical plane, means for severing said column into predetermined lengths as the column is being moved downwardly, means below said tile machine for receiving said severed sections, a second receiving means for delivering the severed sections to the first receiving means, the last said receiving means being adapted to travel downwardly at a speed higher than the speed of the column.

2. The combination of a tile machine arranged to deliver a continuously moving column of plastic material downwardly and in a vertical plane, means for severing said column into predetermined lengths as the column is being moved downwardly, means below said tile machine for receiving said severed sections, a second receiving means for delivering the severed sections to the first receiving means, the last said receiving means being adapted to travel downwardly

at a speed higher than the speed of the column, and means for varying the downward speed of the last said receiving means.

3. In combination, a receiving conveyor, a tile machine located above said conveyor and capable of discharging a continuously moving column of plastic material downwardly and in alinement above said conveyor, means interposed for severing the said column of plastic material into predetermined lengths, a delivery mechanism interposed between the said conveyor and the said tile machine for receiving the severed tile and delivering them to the said conveyor, said delivery mechanism being controlled through the movement of the severed tile.

4. In combination, a horizontally arranged delivery conveyor, a tile machine capable of producing a continuously and downwardly moving column of plastic material above and in alinement with said conveyor, a cutter carriage yieldably supported relative to said tile machine and capable of movement with said plastic column, a cutter mechanism adapted to sever the said plastic column into predetermined lengths while the carriage is in movement, a primary supporting plate carried by said carriage for actuating the same, a secondary plate, means for yieldably supporting said plate in its upper limit of movement and beneath the said primary supporting plate, means for releasing the said primary plate to deliver the tile to said secondary plate, said secondary plate being so supported that it will travel downwardly at a speed greater than the downward speed of the said primary supporting plate, and means for releasing the said secondary plate and delivering the tile to said conveyor.

5. In combination, a horizontally arranged delivery conveyor, a tile machine above said conveyor designed to deliver a column of plastic material downwardly and toward said conveyor, said tile machine being provided with guide members parallel with said column, a cutter carriage slidably mounted on said guides, springs for yieldably holding the cutter carriage to its upper limit of movement, a pivoted member carried by said carriage for carrying a supporting plate, a cutter mechanism carried by said carriage, means for moving the carriage downwardly against the action of the springs in unison with the movement of said column, means for releasing the last said means when the carriage has traveled a predetermined distance, and means for actuating said cutter as the carriage is being moved downwardly.

6. In combination, a tile machine arranged to deliver a continuously moving column of plastic material downwardly in a vertical plane, a receiving conveyor below said column, means for severing the column into predetermined lengths, or tile, a delivery mechanism for receiving the severed tile and delivering them to said conveyor, said mechanism comprising a pantograph mechanism designed to carry a receiving plate slidably carried by the pivoted end of said pantograph, said plate being designed to slide in a horizontal plan and to be moved upwardly and downwardly, means for yieldably holding the plate in an elevated position to receive tile from the said carriage, and means for moving said plate as it reaches its lower position of movement.

7. The combination of a tile machine arranged to deliver a continuously moving column of plastic material downwardly and in a vertical plane, a receiving conveyor below the delivery end of said column, means for severing the said column into predetermined lengths to form tile as the column is being moved downwardly, and means for receiving the severed tile and delivering it to said conveyor, said receiving means being adapted to travel downwardly at a speed higher than the speed of the column toward said conveyor and forwardly in a direction of the movement of said conveyor, and means for delivering the tile to said conveyor from said receiving means.

8. The combination of a tile machine arranged to deliver a continuously moving column of plastic material downwardly and in a vertical plane, a receiving conveyor below the delivery end of said column, means for severing said column into predetermined lengths as the column is being moved downwardly, means for receiving said severed sections and actuated by the weight thereof to deliver them to said conveyor, means for releasing the severed sections from said receiving means when at its lower limit of movement, and spring actuated means for returning said receiving means to its normal position of movement.

9. The combination of a tile machine arranged to deliver a continuously moving column of plastic material downwardly and in a vertical plane, a receiving conveyor below the delivery end of said column, means for severing said column into predetermined lengths as the column is being moved downwardly, means for receiving said severed sections and actuated by the weight thereof to deliver them to said conveyor, means for releasing the severed sections from said receiving means when at its lower limit of movement, spring actuated means for returning said receiving means to its normal position of movement, and means for varying the tension of said spring.

Des Moines, Iowa, July 19, 1923.

HALVER R. STRAIGHT.