Oct. 10, 1933. H. C. KINNEY 1,929,893

SCORING MACHINE

Filed Aug. 21, 1930 5 Sheets-Sheet 1

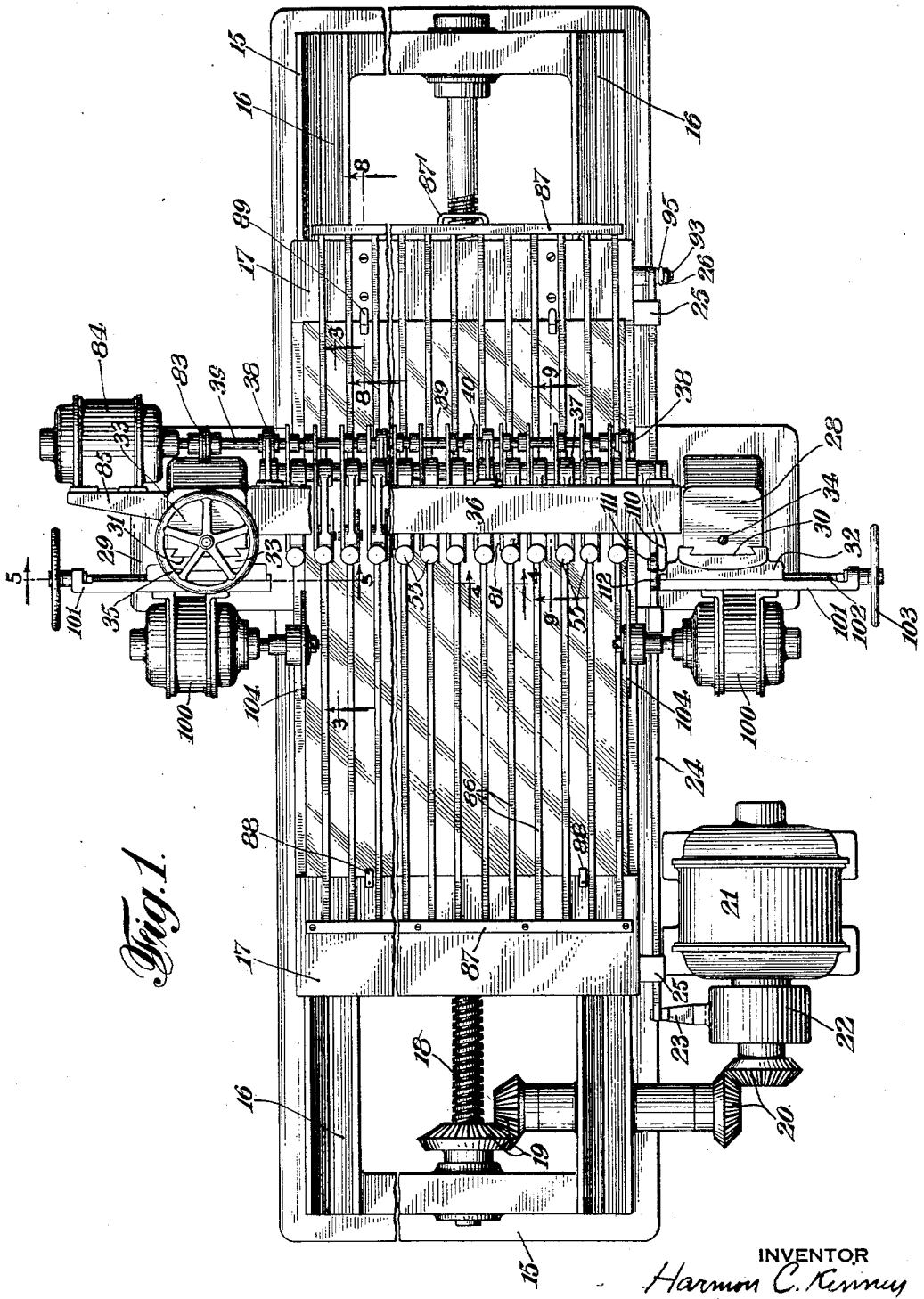

Fig. 1.

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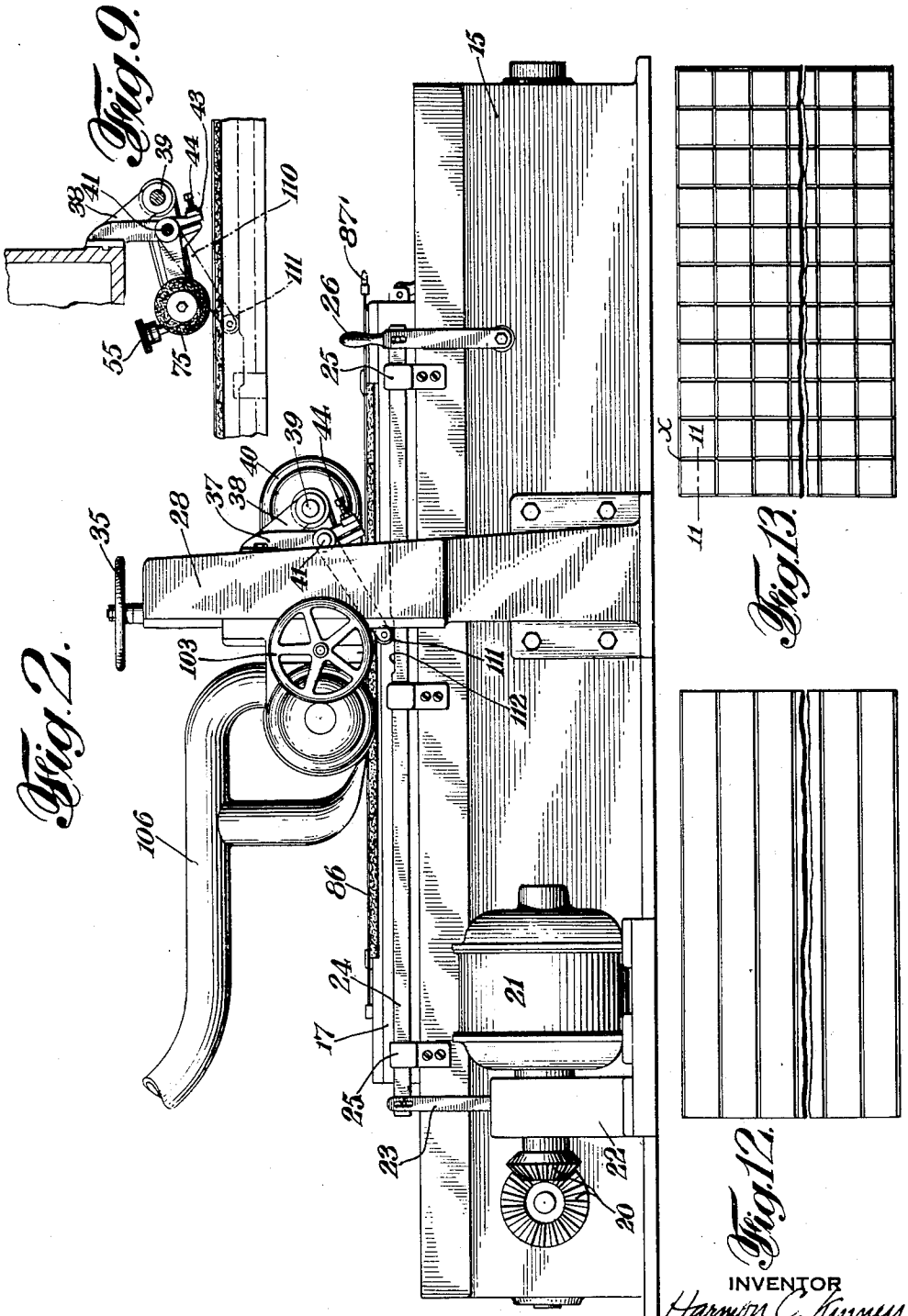

Fig. 2.

Fig. 13.

Fig. 12.

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SCORING MACHINE

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Fig. 3.

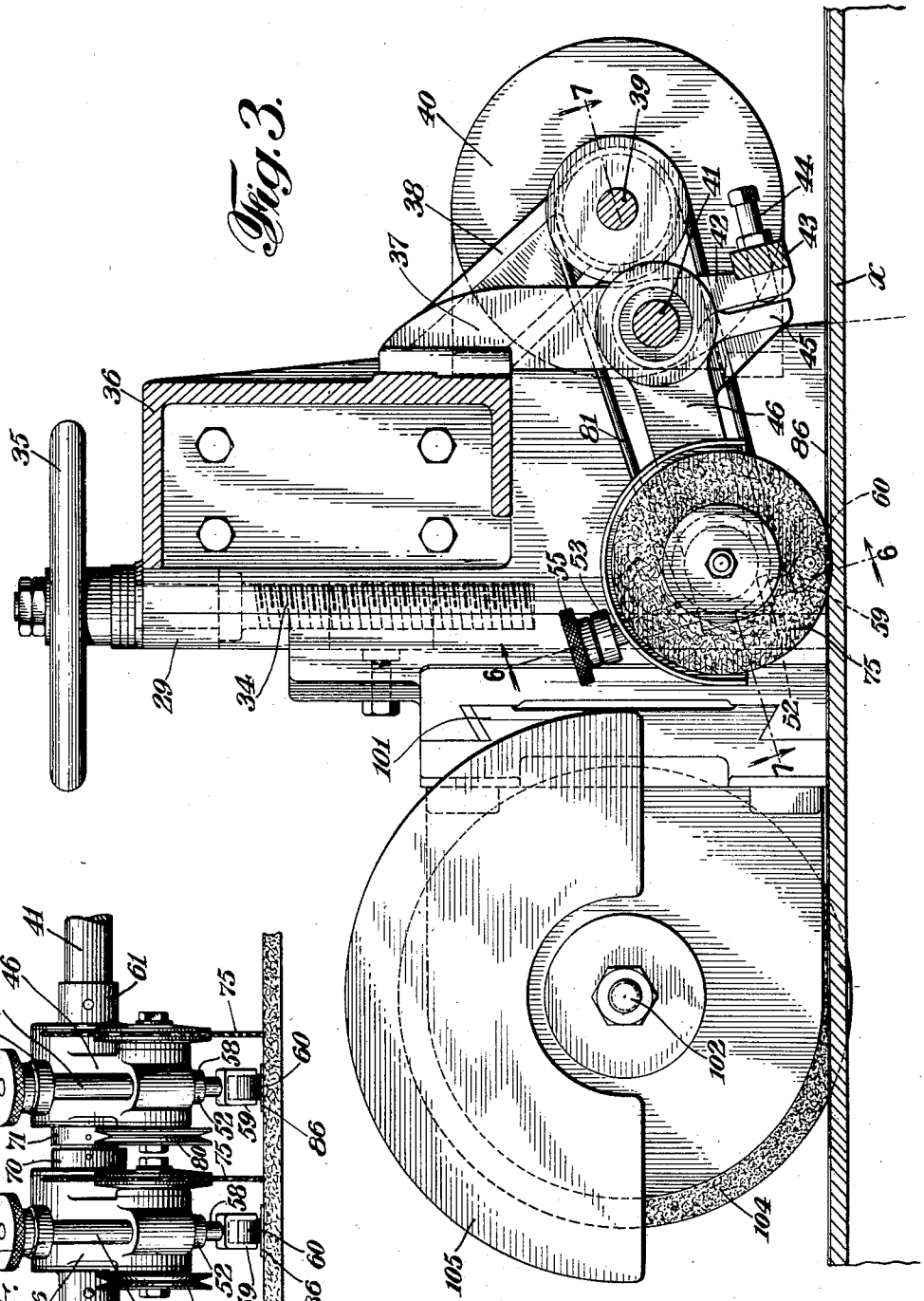

Fig. 4.

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SCORING MACHINE

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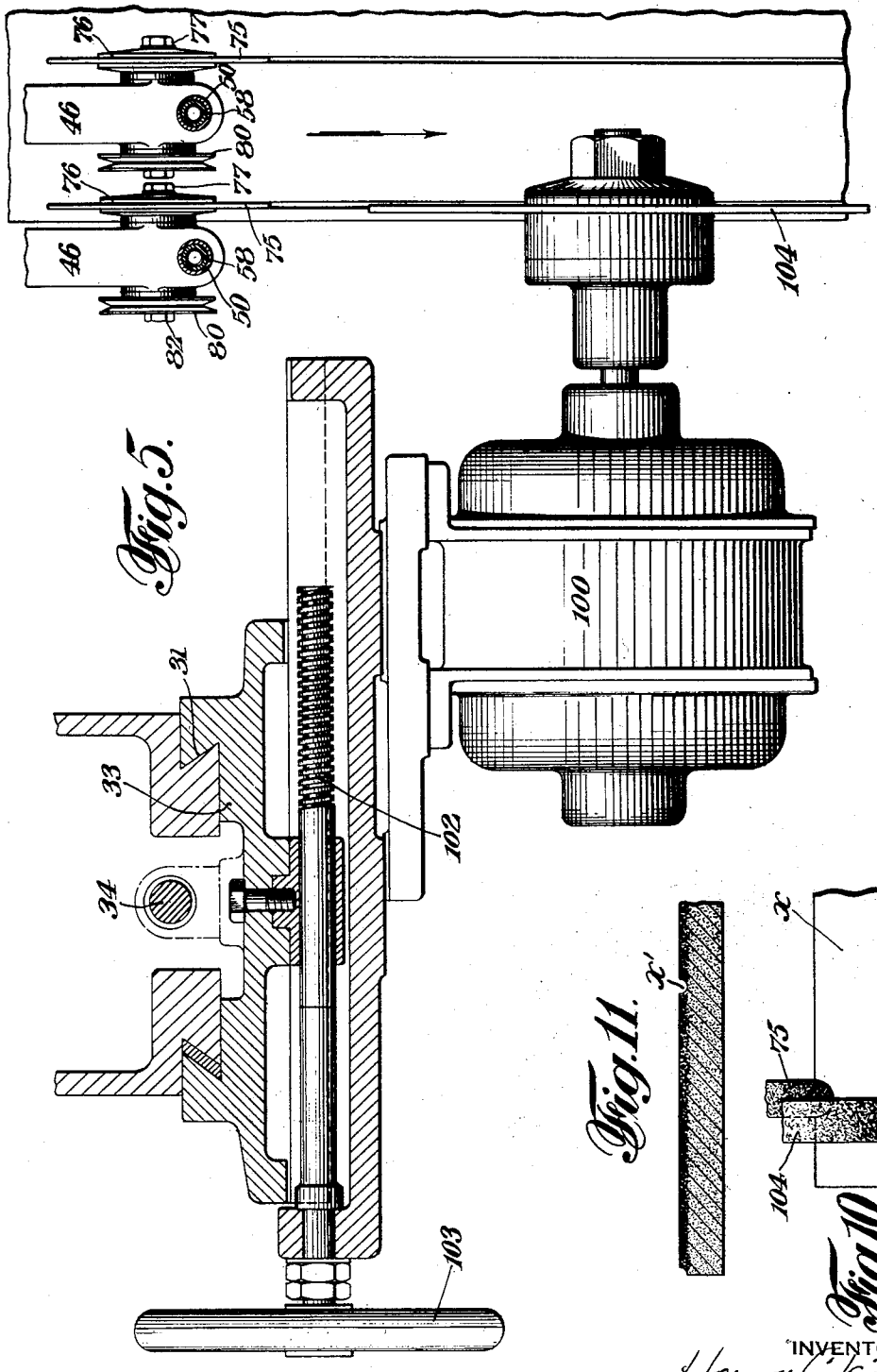

Fig. 5.

Fig. 11.

Fig. 10.

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SCORING MACHINE

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Fig. 6.

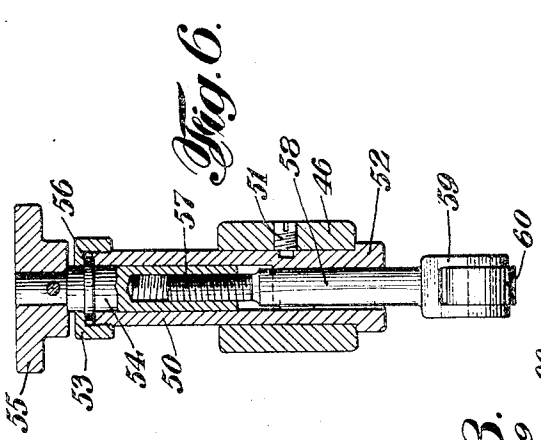


Fig. 8.

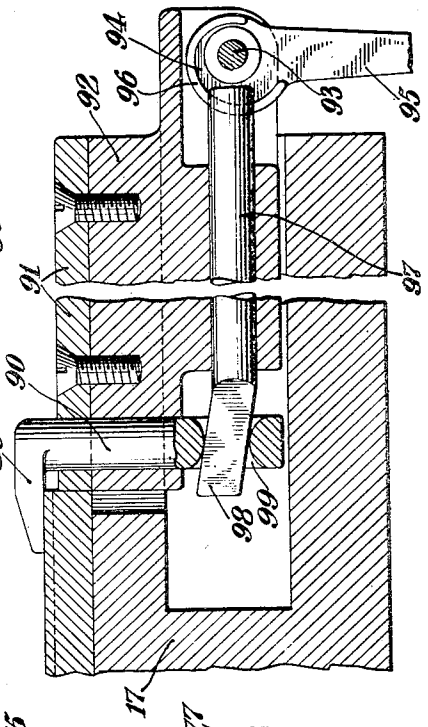
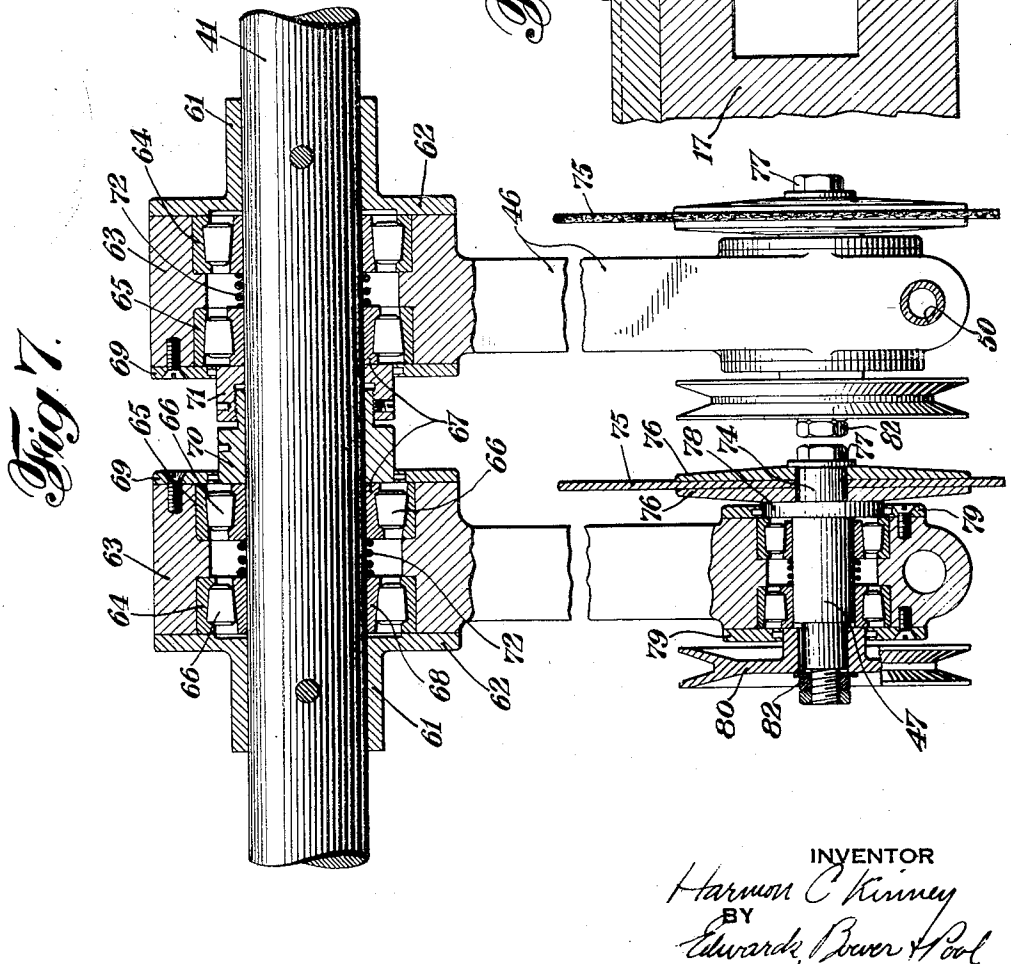


Fig. 7.



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Patented Oct. 10, 1933

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UNITED STATES PATENT OFFICE

1,929,893

SCORING MACHINE

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Application August 21, 1930. Serial No. 476,807

11 Claims. (Cl. 51—92)

This invention relates to scoring machines, and more particularly to those adapted to groove a surface with a series of parallel lines at one operation.

While the particular purpose of the present invention is to produce the appearance of hand laid tiling on a vitrified or other hard surfaced slab or plate of material, it will be understood that the mechanism is adapted to many other uses where a checkered surface is desired.

It is an object of this invention to provide a mechanism adapted to operate on the surface of hard finished slabs of asbestos cement and the like, fully cured, dried and permanently set.

A further object is in the provision of means for maintaining the scored grooves uniformly spaced and of equal depth and width, irrespective of superficial unevenness or undulations of the slab, and without scratching or defacing its finish.

Another aim is to provide means for facing the edges of a slab, coincident with the grooving operation, and in such manner as to be parallel with the scoring so that accurate edge joints are produced.

A still further purpose is to provide supports for the rotary cutters, so arranged as to resist lateral strain in an unusually effective manner.

These and other advantageous objects, which will appear as the description progresses, are accomplished by the novel design, construction and combination of parts hereinafter described and illustrated in the accompanying drawings, forming a material part of this disclosure, and in which

Fig. 1 is a top plan view of an embodiment of the invention as assembled for operation, parts being broken to show the construction.

Fig. 2 is a front side elevational view of the same, showing the dust removing device.

Fig. 3 is an enlarged fragmentary longitudinal sectional view, taken on line 3—3 of Fig. 1.

Fig. 4 is a fragmentary transverse sectional view taken on line 4—4 of Fig. 1, showing the cutter adjusting means.

Fig. 5 is a transverse sectional view of the edge trimmer cutter and associated parts.

Fig. 6 is a longitudinal sectional view of the cutter depth control device taken on line 6—6 of Fig. 3.

Fig. 7 is a similar sectional view of the cutter spindle supports showing their construction, the section being taken on line 7—7 of Fig. 3.

Fig. 8 is a fragmentary sectional view, taken on line 8—8 of Fig. 1, showing the slab clamping device on enlarged scale.

Fig. 9 is a similar sectional view taken on line 9—9 of Fig. 1, showing the cutter raising means at the rearward movement of the slab.

Fig. 10 is a schematic view, illustrating the method of trimming the edges of the slab.

Fig. 11 is an enlarged sectional view of the slab, taken on line 11—11 of Fig. 13.

Fig. 12 is a plan view of a slab, showing longitudinal grooves as produced by the first operation, and

Fig. 13 is a similar view of the slab after the second operation.

In the embodiment of the invention shown in the drawings the machine consists of a heavy oblong rectangular bed 15 having a flanged base and at its upper longitudinal edges guide grooves 16 to receive a platen 17 moved by a helical screw 18 journalled in the ends of the bed. This screw is driven by bevelled gear pairs 19 and 20 the latter being mounted on the outer end of a spindle projecting through the side of the bed and in turn being driven by a reversible electric motor 21 mounted on the side of the bed. A motor control box 22 has an actuating lever 23 moved by a bar 24, slidably arranged in brackets 25 fixed on the upper front edge of the bed, and provided with a hand actuating lever 26 pivoted to the bed and arranged for convenient operation in reversing the direction of movement of the platen 17.

Rigidly engaged on the front of the bed 15 is an upright post 28, an essentially similar post 29 being provided on the opposite side of the bed. Mounted in undercut guide-ways 30—31 of these posts are vertical slides 32—33, actuated by screws 34 provided with hand wheels 35. Fixed to the slides, to extend rigidly therebetween, is a hollow horizontal beam 36 having adjustably engaged a plurality of downreaching brackets 37, and a similar series of forwardly extending brackets 38.

Rotatably mounted in the ends of the brackets 38 is a transverse shaft 39, carrying at spaced intervals a series of grooved pulleys 40. Mounted in the lower ends of the brackets 37 is another shaft 41 to which are rigidly attached dogs 42 carrying transverse bars 43, through which passes a series of adjusting screws 44, their points impinging on lugs 45 formed on rearwardly extending bars 46, journalled on shaft 41 and carrying at their outer ends spindles 47, which will be further on described in greater detail.

Passing transversely through the ends of the bars 46 are sleeves 50, (see Figs. 4 and 6), held

against motion by set screws 51, provided at their lower ends with enlarged portions 52 abutting the underside of the bars 46 while their upper ends are screw-threaded to receive cap nuts 53. Rotatably mounted in the sleeves 50 are spindles 54, reduced at their upper ends to which are secured knobs 55 adapted for hand operation. Formed on the spindles 54 are collars 56 clamped against the upper ends of the sleeves 50 by the cap nuts 53 in such manner as to prevent the spindles moving longitudinally, but permitting them to be rotated.

The lower end of the spindles 54 are bored and screw-threaded to receive screws 57 formed on the upper ends of stems 58 projecting outwardly below the sleeves 50 and terminating in forks 59 in which are rotatably mounted rolls 60, the forks being offset forwardly so that the axes of the rolls 60 are in advance of the axes of the spindles 54, as best seen in Fig. 3.

Returning now to the shaft 41 and bars 46, it will be seen that pinned, or otherwise rigidly engaged at fixed spaced intervals to the shaft, are hubs 61 arranged in reverse relation, having flanged opposed faces 62, preferably recessed as shown, and against these flanges abut opposed hubs 63 formed on the bars 46, these hubs being bored to receive conical roller bearing races 64—65, respectively, on their inner and outer sides, the races 64 being internally recessed to receive tapered rollers 66, while the races 65 are plainly conical to receive similar rolls.

The inner core members of the roller bearings, respectively 67—68, are close fitted to the shaft 41, the members 67 being annularly groved to receive the rollers 66 while the opposed members 68 are plainly conical. Screwed to the inner adjacent faces of the hubs 63 are washers 69 abutting the races 65 to maintain them in position, while the races 64 abut in a similar manner the flanges 62 of the fixed hubs.

Adjustably on the shaft 41 are collars 70—71 having inter-engaging screw-threaded elements, whereby upon rotating the element 70 with respect to the opposite element 71, the collars may be adjusted so that their outer faces, which bear against the races 67, force them outwardly carrying the rolls 66 with them and affording an accurate relative adjustment.

The outer roller bearings are kept tight by the interposition of coiled compression springs 72, encircling the shaft 41, so that an equal pressure of the bearings on the shaft is adjustably maintained.

At the outer end of the bars 46, the spindles 47 are journalled in bearings which correspond identically to those previously described, adjustment in this case being obtained, however, in a slightly different manner. Fixed on a reduced end portion 74 of the spindles 47 are thin abrading wheels 75, held between clamp washers 76 by nuts 77 threaded on the ends of the spindle against collars 78 abutting the spindle shoulder, these washers in turn being held by plates 79 screwed to the adjacent sides of the bar, while on opposite sides are similar plates bored to receive the hubs of pulleys 80 driven by belts 81 run over the driving pulleys 40 on the shaft 39.

Adjustment of the spindle 47 is obtained by nuts 82 threaded on the opposite end of the spindles 47, and suited to draw the hubs of the pulleys 80 against the inner elements of the roller bearings, as plainly shown in Fig. 7. The shaft 39 is driven through flange connections 83 with the shaft of a motor 84, carried by a bracket 85 fixed to the slide 33, opposite the beam 36, as best seen in Fig. 1.

The spindle 58 is so adjusted that roller 60 bearing upon the thin flexible strip 86 will guide the cutting disk 75 to the proper depth of scoring, but without contact of the roller with the surface slab. The roller 60, therefore, does not follow all of the minute irregularities of the slab surface, but only such average variations as will be conformed to by the flexing of the thin strip 86. These strips 86 are raised and cleaned at each operation, being joined together for movement as a unit by the transverse bars 87 at their ends, one of which bars is provided with a handle 87'. These thin strips also guide the dust from the abrading wheel causing irregularity in guiding or scratching or marking on the smooth faces of the slabs.

The movements of the grinding wheels 75 to and from the slab are along arcuate lines around the axis of the shaft 41 as a center, such movement being substantially inclined forward in the direction of progress of the cutting wheel relative to the slab during the grooving operation. The axis of adjustment of the spindle 58 for roller 60 is correspondingly inclined forward at somewhat the same angle with relation to the slab, this forward inclination aiding in giving the guiding and cutting actions smoothness and accuracy in operation.

The slabs X are held on the platen 17 of the machine at one end by clips 88 fastened to the platen surface, and at the other end by clips 89, having stems 90 passing downward through a guide plate 91 (see Fig. 8) fixed in a slide 92 movable lengthwise at the end of the platen, and having mounted at its outer end a spindle 93.

Rotatable on the spindle is an eccentric head actuated by a lever 95, this head having a raised element 96 engaging in a corresponding slot in a clamp slide 97 movable freely in the lower part of the element 92, and having at its forward end a raised portion 98 of parallel thickness adapted to engage in openings 99 of the stem 90, these openings being rounded from top to bottom.

From the foregoing it will be understood that upon movement of the lever 95 the clips 89 may be released or drawn powerfully downward, clamping the work firmly in position on the platen.

In order to trim the side edges of the slabs in parallelism with the grooves formed by the abrading wheels, a pair of opposed motors 100 are mounted upon transverse slides 101 held in undercut recesses in the rear sides of the uprights 28—29, these slides being adjusted by screws 102 actuated by hand wheels 103.

Carried by the motor shafts are thin abrading wheels 104, these wheels being considerably in excess of the diameter of the wheels 75 and are preferably provided with guards 105.

It is to be noted that the edge trimming wheels are each adjustable in position laterally relative to the grove XI as apparent in Fig. 10 in which the grooves XI, made by the wheels 75, are bisected by the wheels 104, so that the joints between adjacent slabs are formed at the bottoms of the grooves, which, by reason of being ground simultaneously cannot vary in any manner.

If desired a suction tube 106 may be arranged over the grooving wheels so that a forced suction effect is produced, removing the dust of the grinding in an effective manner.

In order to raise the scoring wheels during

reverse movement, shaft 41 has secured to it a rigid arm 110 carrying at its end a roller 111 positioned to ride in a notch 112, formed in the upper surface of the bar 24 when the bar is in position corresponding to the forward movement of the platen, but when it is reversed the bar 24 moves to force the roller up on the top of the bar, thereby tipping shaft 41 and the pawls 42 so that pins 44 engage arms 45 to raise the several abrading wheels above the surface of the slab, this operation taking place automatically upon movement of the lever 26 and before the return movement begins. When the scoring has been completed, as seen in Fig. 12, the slab is removed and replaced on the platen in a position at an angle to the first position, thereby producing a desired cross line effect such as that indicated in Fig. 13.

Accurately maintained alinement of the scoring wheels insures a grooving that is precise within very narrow limits so that the various slabs produced at different times may be arranged edge to edge with a very close alinement of the score lines and the appearance of substantial continuity, thus avoiding any accentuation of the lines of joinder between adjacent slabs and the irregularities that would be very evident in the attempt to register lines even a very little out of place. The accuracy of registering the grooving of the slabs made by this machine is so precise as to leave practically no observable differences at the joints.

As changes of construction could be made within the scope of the invention, it is intended that all matter contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In apparatus for scoring a series of parallel lines on slabs and the like, the combination with means for holding the slab, of means for positioning the grinding wheels accurately with relation to each other and maintaining said alinement, means for producing relative movement between the slab holding means and the grinding wheels, and means for guiding said wheels to give a predetermined depth of scoring comprising a flexible member on said slab and a guide roller moving along said member and determining the depth of the cut.

2. A slab scoring machine comprising a horizontal bed, a platen slidable therealong,, means to actuate said platen in opposite directions selectively, means to clamp a work part thereon, a series of spaced abrading wheels to score the work part when moving in one direction, and means to automatically raise said wheels when the platen is moved in an opposite direction.

3. A slab scoring machine comprising a horizontal bed, a platen slidable therealong in either of two directions, a manually operable shift bar controlling the direction of platen movement, releasable means to clamp a slab on the platen, abrading wheels to score the slab when the platen moves in one direction, and means actuated by said bar to raise said wheels collectively above the surface of the slab when the platen is moved in a reverse direction.

4. A slab scoring machine comprising a horizontal bed, a platen slidable therealong in either of two directions, a manually operable shift bar controlling the direction of platen movement, releasable means to clamp a slab on the platen, abrading wheels to score the slab when the platen moves in one direction, brackets carrying said wheels, a shaft on which all of said brackets are fixed, means operated by said bar for imparting semi-rotation to said shaft whereby the wheels are raised and lowered in unison, and means for adjusting said wheels independently.

5. A slab scoring machine comprising a horizontal bed, a platen slidable therealong in either of two directions, a manually operable shift bar controlling the direction of platen movement, releasable means to clamp a slab on the platen, abrading wheels to score the slab when the platen moves in one direction, brackets carrying said wheels, a shaft on which all of said brackets are fixed, means operated by said bar for imparting semi-rotation to said shaft whereby the wheels are raised and lowered in unison, and means for adjusting said wheels in conformity to the surface of the slab.

6. A slab scoring machine comprising a horizontal bed, a platen slidable therealong in either of two directions, a manually operable shift bar controlling the direction of platen movement, releasable means to clamp a slab on the platen, abrading wheels to score the slab when the platen moves in one direction, means for adjusting the depth of cut of said wheels with resepct to the surface of the slab, automatic means for raising the wheels upon reversal of platen movement, and wheels of larger diameter to trim the edges of the slab simultaneously with the operation of the scoring wheels.

7. In a slab scoring machine having a platen reciprocatively mounted, motor means for actuating said platen in either direction, a shiftable bar controlling the movement of the motor, manual means for actuating said bar, said bar having a recess in its upper surface, a plurality of abrading wheels mounted to be raised and lowered, and a lever controlling the movement of said abrading wheels, said raising and lowering means being actuated by said bar.

8. In a slab scoring machine having a horizontal platen and means for actuating said platen reciprocatively, of a beam extending over said platen, a motor driven shaft mounted on said beam, a pivot shaft, a plurality of brackets rigidly fixed on said shaft, abrading wheels rotatable in said brackets, a series of removable strips disposed over slabs fixed on said platen, and rolls carried by said brackets to move over the surface of said strips whereby said wheels are automatically raised and lowered in accordance with the surface of the slab.

9. In a slab scoring machine, in combination with a bed having a platen slidable in a horizontal plane, means for moving said platen in either of two directions, means for clamping a slab on the platen, brackets extending upwards from over said bed, slides movable vertically in said brackets, a beam carried by said brackets to extend over the platen, a series of abrading wheels carried by said beams at fixed distances apart, means for driving said wheels, automatic means for raising and lowering said wheels with reference to the slab and in accordance with its upper surface, means for raising said wheels above the slab upon reverse movement of said platen, a pair of abrading wheels adjustable with reference to the track of the outermost scoring wheels, and means for driving said last named wheels to trim the slab centrally of the outermost grooves formed by the first named wheels.

10. The combination with a slab scoring ap-

paratus having a slab support, of a scoring wheel, an arm pivoted on an axis parallel to the surface of the slab and carrying said wheel, a supporting means on said arm comprising a roller adapted to engage the surface of the slab immediately adjacent to said wheel and lift or drop said wheel in accordance with the shape of said surface so that the wheel will follow the contour of said surface, and means for rotating said wheel.

11. The combination with a slab scoring apparatus having a slab support, of a series of scoring wheels, arms pivoted on an axis parallel to the surface of the slab and carrying said wheels, a separate support on each arm carrying a wheel in position to engage the surface of the slab immediately adjacent to the corresponding wheel and raise or lower said wheel in accordance with the shape of the adjacent surface so that each wheel will follow the contour of said surface along its own line, and means for individually rotating each of said wheels.

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