

March 24, 1964

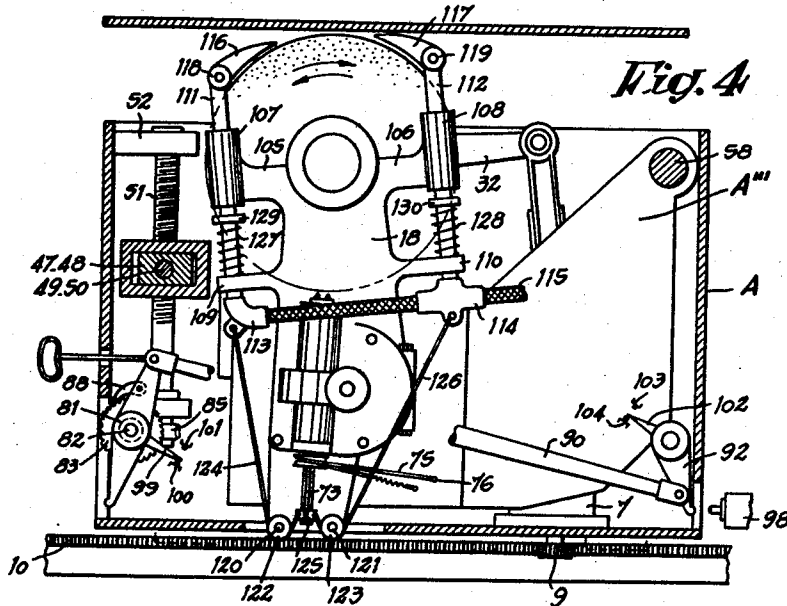
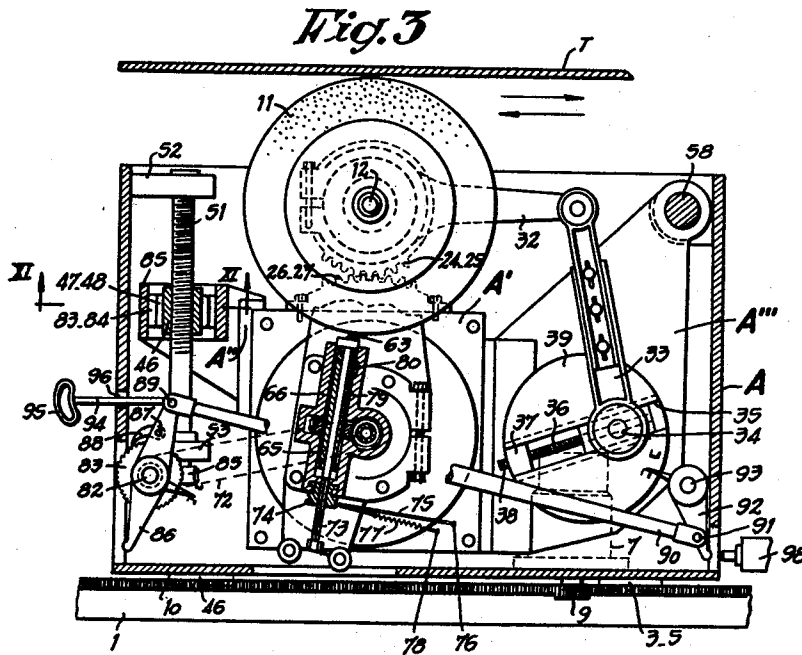
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3,125,832

MACHINERY FOR CUTTING PLATES

Filed July 25, 1960

4 Sheets-Sheet 2



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Fig. 5

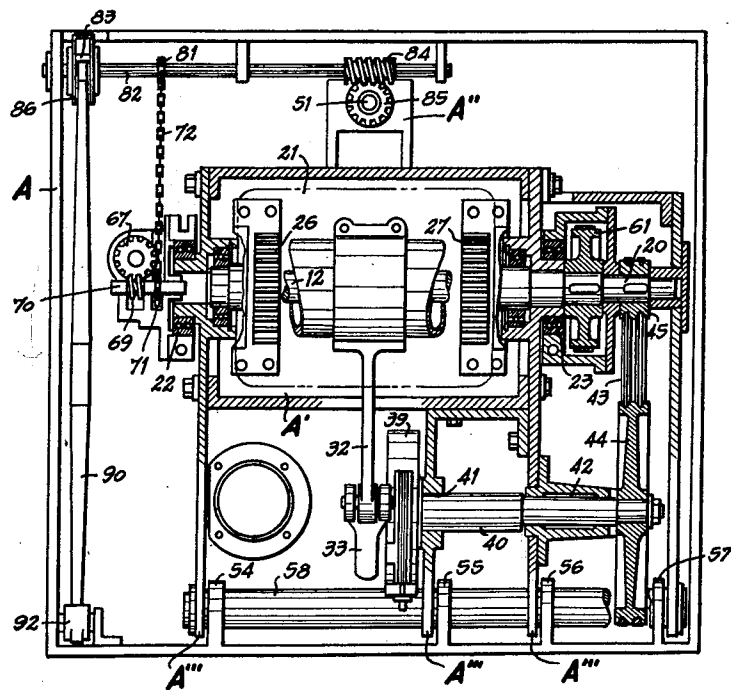
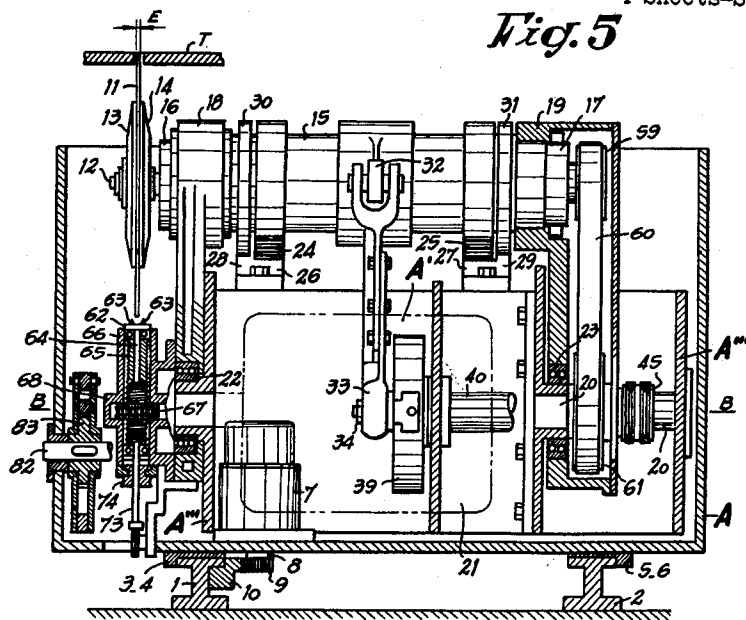


Fig. 6

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Fig. 7

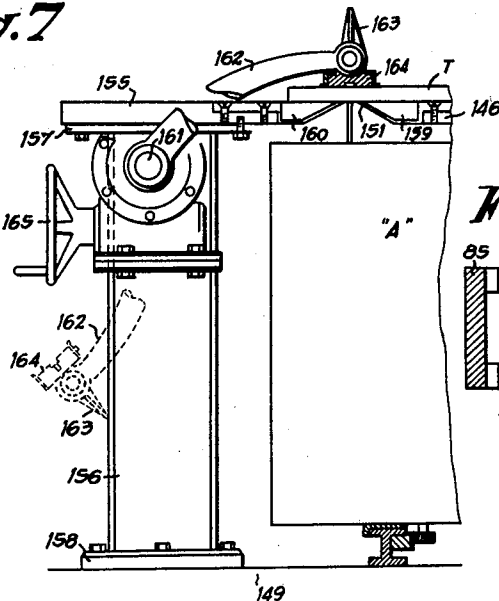


Fig. 11

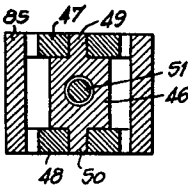


Fig. 9

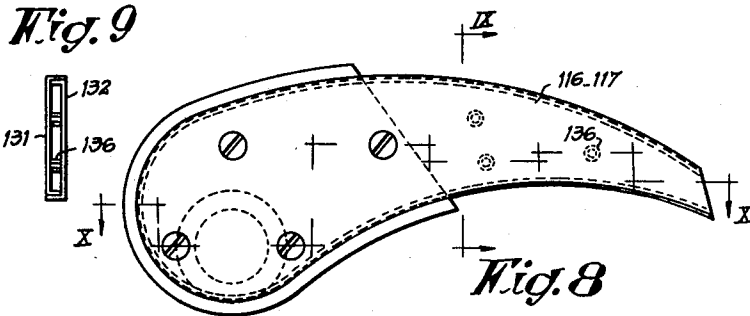


Fig. 8

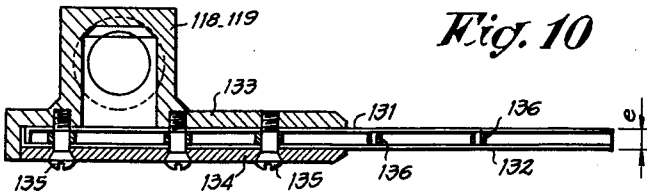


Fig. 10

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MACHINERY FOR CUTTING PLATES

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11 Claims. (Cl. 51—33)

The subject of the present invention is machinery for cutting by grinding at high speed, plates, more particularly plates of large dimensions, thin or thick, without the said plates undergoing deformation and whilst permitting perfectly rectilinear edges to be obtained.

The subject of the present invention embraces a particularly original machine capable of applying industrially, systematically and economically a means for cutting plates of all kinds, and it comprises in combination at least one cutting device formed by at least one grinding wheel and mechanisms necessary to drive the grinding wheel in its characteristic simultaneous movements of rotation, oscillation and translation along the plate; by at least one guide and travelling way of the cutting device; by a mechanism for driving the cutting device in an alternating longitudinal translational movement over the whole extent of the line of cut; of a support or table to fasten the plate to be cut firmly and correctly in the presence of the cutting device; by the means for fastening the plate to be cut on the support or table; by a means for shaping and lubricating the grinding wheel whilst it is working; by the means to shift the grinding wheel and its shaping and lubricating devices periodically after each cut towards the plate, and to shift the shaping and lubricating devices towards the grinding wheel so as to make allowance for the peripheral wear thereof, by a means to collect and discharge the cutting waste, and preferably but by way of an addition, by a centralised control and supervision station to take over the normal operation of this machine.

In addition to the fundamental character of the machinery, the invention likewise relates to a number of new arrangements which determine in the machine, technical effects which are particularly favorable to rational functioning, faultless work and really surprising output.

These characteristics and results will emerge more clearly from the detailed description of the essential elements of such a machine, which are illustrated in an adequate manner in the accompanying drawings, wherein:

FIGURE 1 is a schematic view in elevation of a machine constructed in accordance with the present invention;

FIGURE 2 is a schematic view in plan of the machine in FIGURE 1;

FIGURE 3 is an elevation with partial section showing more particularly the mechanisms contained in the casing marked A in FIGURE 1;

FIGURE 4 is a similar view to FIGURE 3, but showing different sections of the said casing A;

FIGURE 5 represents the same mechanisms contained in the casing A, according to sections at right angles to those in FIGURES 3 and 4;

FIGURE 6 represents, in plan with various sections, the same mechanisms contained in the casing A;

FIGURE 7 shows schematically, in two characteristic positions, a complementary device for fastening the plate on its support during cutting;

FIGURE 8 shows, in elevation, a lubricating nozzle;

FIGURE 9 is a section along the line IX—IX in FIGURE 8;

FIGURE 10 is a section along the line X—X in FIGURE 8;

FIGURE 11 is a schematic section along the line XI—XI in FIGURE 3.

In the example illustrated the machine subject of the

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invention is constituted in the following manner: a casing A carried by two longitudinal rails 1—2, through the intermediary of four shoes, 3—4 and 5—6, is capable of being moved by sliding along the rails 1—2 in two opposite directions over the entire length L, which determines the maximum cutting-off length of the machine.

The drive of the casing A in its alternating longitudinal movements is performed by an electric motor 7, the shaft 8 of which carries a toothed pinion 9 engaging with a rack 10 fastened to one of the aforesaid rails, in fact to the rail 1 and along the entire length thereof.

The cutting device properly speaking is constituted by at least one grinding wheel 11 secured on a spindle 12 and clamped between two cheeks 13—14.

The grinding wheel 11 and its spindle 12 revolve in the centre of a boss 15 which is itself pivoted and locked axially by the rings 16 and 17 positioned, at each of its ends, against the upper boring of each of the arms 18 and 19, the lower portion of the arms being journalled concentrically with the shaft 20 of the motor 21 through the intermediary of ball bearings 22—23.

This group has the form of a portal, the transverse boss 15 of which actuates two toothed segments 24—25 engaging in the teeth of two curved racks, 26 and 27 respectively, and running on the tracks 28—29 on which rest the rollers 30—31 respectively. This group concentric with the main axis B—B is also concentric with that of the shaft 20 of the motor 21, in such a manner that the oscillations obtained with the aid of a connecting-rod 32 integral with the aforesaid transverse boss 15 are parallel to the said axis B—B. This connecting-rod 32 is driven by the adjustable connecting-rod 33 pivoted on the stud 34 radially adjustable in a slide 35 by means of a screw 36 pivoted in the bearing 37 and actuated through the square end 38. The flywheel 39, keyed and pivoted by its spindle 40 in the brackets 41—42, is driven rotationally by the belts 43 passing over the pulleys 44—45, the latter being keyed on the shaft 20 of the motor 21. The motor is positioned inside the prismatic casing A'. Mounted on one of the side-pieces of this casing A' is the bracket A'' which is supported on the nut 46 through the intermediary of the sliding pads 47—48 which in turn are supported on the journals 49—50 integral with the aforesaid nut 46 mounted on the threads of the screw 51. This screw is held by the upper fixed block 52 and lower fixed block 53 in the reduction gear-casing A. Mounted on the opposite sidepiece of the prismatic casing A' is the articulated bracket A''' pivoted in the bearings 54—55—56—57 through the intermediary of the shaft 58. It follows that when the screw 51 is turned the group formed by the prismatic casing A' and the two brackets A''—A''' is able to move closer to or farther from the plate T in proportion to the cutting requirements. At the end of the grinding wheel spindle 12 is mounted a pulley 59 connected by a belt 60 to a second pulley 61 keyed onto the said shaft 20 attached to the drive motor 21 by any known means (not shown).

Inside the casing A and integral with the false casing A' are located the shaping device enabling the shaping of the grinding wheel, as well as devices for the sharpening of the grits, the compensation for grinding wheel wear and that of the lubrication bases, to be synchronized from a single control. These devices consist essentially of a head 62 carrying the diamonds 63. The head is integral with the shaft 64 which passes with gentle friction axially through an externally threaded rod 65 housed in the boss 66 and engaging in the threaded central hole of a helicoidal wheel 67 fitted into a housing 68 forming part of the boss 66, in such a manner that the helicoidal wheel 67 is able to turn about its axis without undergoing transverse movements. This wheel 67 is capable of being driven by an endless screw 69 keyed

onto the shaft 70 onto which is likewise keyed the sprocket wheel 71 driven by the chain 72. The shaft 64 is prolonged downwards by a longitudinal slotted section 73 on which is mounted in a slidable manner a grooved pulley 74 arranged so as to be engaged in the lower portion of the boss 66 so that it can be driven to rotate about its axis only, whilst permitting longitudinal sliding movements of the slotted section 73, or of the shaft 64, driving by virtue thereof the diamond head 62—63. Supported on this pulley is a cable 75 of which one end is anchored at a fixed point 76 of the false casing A', whereas the other end is secured to one end of a spring 77, the other end of which is anchored at a fixed point 78 likewise integral with the false casing A'.

The aforesaid threaded rod 65 has in its upper portion a longitudinal slot 79 in which is engaged a dog 80 integral with the corresponding internal portion of the boss 66. This arrangement enables the threaded rod 65 to move axially without turning about its axis. The boss 66 is secured to the first connecting-rod 18 of the oscillating portal.

The device which has just been described provides for the shaping tool to be set in motion periodically by the oscillating action of the portal. The need should also be borne in mind to move the grinding wheel and its shaping and lubricating devices, after each run, towards the plate to be cut for the purpose of a fresh run, and to shift the shaping and lubricating devices towards the grinding wheel in order to compensate the peripheral wear thereof. To this end, the aforesaid chain 72 coming from the sprocket wheel 71 connects the latter with the chain wheel 81 keyed onto the shaft 82. Likewise keyed onto the latter are the ratchet wheel 83 and an endless screw 84. This last engages continuously with the helicoidal wheel 85 keyed to the lower end of the aforesaid threaded rod 51 of the oscillating device for the casing A'—A''—A'''. Mounted loosely on the shaft 82 is a small beam 86 on which is articulated by the pivot 87 a pawl 88 continuously engaged in the aforesaid ratchet wheel 83, and one end of the beam 86 is articulated by a pivot 89 to the end of a connecting-rod 90, the other end of which is articulated by the pivot 91 to a small lever 92, articulated in turn by the pivot 93 to the outer casing A. Also attached to the aforesaid pivot 89 is one end of a link-rod 94, the other end of which terminates in a manual control handle 95. This link-rod 94 passes through apertures 96 in the outer casing A. Level with the second free end of the beam 86 and with the free end of the lever 92, towards the two limits of travel of the casing A, are arranged fixed stops, 97—98 respectively. These stops are movable, or adjustable, so as to allow of precise determination of the automatic control moments of the beam 86, of the lever 92, and of the organs driven by the same.

Moreover, the aforesaid beam 86 carries a needle 99 which is able to move between two electrical contactors 100—101, the latter being capable of operation by the needle; moreover, the aforesaid lever 92 is integral with a needle 102 capable of moving between two electrical contactors 103—104 and of actuating the latter alternately. These electrical contactors 100 to 104 control respectively, the feed circuit and the direction or rotation of the motor 7 which provides for the alternating longitudinal movements of the external casing A and of all the organs carried thereby.

For the purpose of effecting continuous lubrication of the grinding wheel 11 during its work phases, the following lubricating device is provided: the aforesaid connecting-rod 18 of the oscillating portal has two lateral arms 105—106, each terminating at the end in a tubular guide, 107—108 respectively, positioned as closely as possible to the corresponding face of the grinding wheel; the same connecting-rod 18 further has beneath the lateral arms two other lateral arms, 109—110 respectively, provided with an orifice coaxial to the said correspond-

ing tubular guide. Passing through these tubular guides and orifices with gentle friction are two pipes, 111—112 respectively, each emerging from a union, 113—114 respectively, mounted on a hose 115 emerging from a lubricant supply tank having a suitable, and known, injection pump (not shown). The pipes 111—112 flow into the inlet of a nozzle, 116—117 respectively, to which they are attached by a union, 118—119 respectively, such that the nozzles are brought into the plane of the grinding wheel 11.

It is important that the nozzles should be maintained in a virtually constant position, both with reference to the grinding wheel and with respect to the surface of the plate acted on by the grinding wheel. It therefore follows that the nozzles must be moved automatically with the grinding wheel proportionally to the advance thereof in the thickness of the plate, and with reference to the grinding wheel proportionally to the peripheral wear thereof, in other words to the progressive reduction in its diameter. The first condition is met by the fact that the lubricating system in common with the grinding wheel is integral with the oscillating portal, which in turn is integral with the false casing A'.

The second condition is met by the fact that in addition, the position of the lubricating system is controlled by the mutually relative positions of the above-described shaping device and of the grinding wheel. To this end, there are supported on the connecting-rod 18 of the oscillating portal, through the intermediary of two spindles 120—121, two grooved pulleys, 122—123 respectively. A cable 124 (is) attached by one end to the aforesaid union 113 of the lubricating pipe rests upon the grooved pulley 122 and is secured by its other end to a swivelling anchorage 125 mounted loosely at the end of the slotted section 73 of the shaping device; moreover, a second cable, 126 is attached by one end to the aforesaid union 114 of the lubricating pipes; this cable rests on the second grooved pulley 123 and is attached by its other end to a diametrically opposed point of the same swivelling anchorage 125. Coacting with this device for regulating the position of the lubricating system, return springs, 127—128, are also provided around the aforesaid tubular pipes 111—112 and braced at one end against the arms 109—110 and at the other end on shoulders 129—130 respectively, integral with the tubular pipes.

As regards the lubricating nozzles properly speaking 116—117, they should preferably be made as shown in diagram in FIGURES 8 to 10, by the juxtaposition of two flat shells 131—132 mutually fitted and unified, shells exhibiting a progressively diminishing cross-section of the general form schematized in particular in FIGURE 8.

The rear portion of these nozzles is attached between a cheek 133 and a plate 134 by means of screws 135. The cheek 133 preferably forms part of the aforesaid unions 118—119 into which extend the tubular pipes 111—112 respectively.

In order to obviate any premature deformation of the nozzles, they possess internal spacers 136, which enables the aforesaid shells 131—132 to be made of a thin, light material. The outlet width e of these nozzles will preferably be less than the width E of the grinding wheel, or of the cutting kerf, in such a manner that, resulting from this arrangement, at least the end of the nozzles can enter progressively into the cutting kerf and thus effect lubrication under virtually constant conditions.

All these elements, which constitute the essential portion of the machine, are integral with the casing A or coact therewith.

The machine further possesses the following complementary devices: between the two aforesaid rails 1—2 is provided a pit 137, over the entire length of which extends an Archimedean screw 138 terminating at a collecting shaft 139. This Archimedean screw is driven rotationally by any appropriate manual or automatic means. In fact, the spindle of this Archimedean screw

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carries a chain wheel 140 connected by a chain 141 to a second chain wheel 142, the spindle of which carries a control wheel 143.

This control device may be carried by a central control station 144 surmounted by a main switchboard 145 carrying the various operating, control and safety instruments, especially of the electrical circuits and fluid under pressure.

In order to secure the plate during cutting, use may be made of a suitable table. In fact, the latter is constituted, in an advantageous embodiment, such as illustrated particularly in FIGURES 1, 2 and 7, by an apron 146 extending over a length greater than the greatest length of plate to be cut, and supported laterally with an overhang by pillars 147 on which it rests through the intermediary of feet 148, the pillars bearing on the underlying ground or bed 149 through the intermediary of feet 150. The apron 146 is arranged in such a manner that one of its longitudinal edges 151 is located close to the rectilinear trajectory to be followed by the grinding wheel 11. The overhanging apron 146 is balanced by a number of horizontal joist sections 152 supported by pillars 153 which likewise bear on the underlying ground or bed 149 through the intermediary of distributing feet 154.

Facing the longitudinal edge 151 of the apron 146 are arranged, here and there, apron sections 155 firmly secured at the head of pillars 156 through the intermediary of feet 157, the pillars bearing on the underlying ground or bed 149 by distributing feet 158. The edge of every one of these apron sections 155 directed towards the aforesaid apron 146 is in the same alignment, and this alignment is at a slight distance from and parallel to the aforesaid longitudinal edge 151 of the apron 146. A passage has thus been created, as narrow as possible, but sufficient to permit the grinding wheel to reach and to traverse the plate T supported simultaneously by the apron 146 and the apron sections 155.

In order to facilitate handling of the plate T on the apron 146, the latter and also the balancing joists 152 may carry, suitably distributed, ball or other supports of known type (not shown).

In order easily to secure the plate T simultaneously on the apron 146 and the apron sections 155, there may be provided and fixed in line with the adjacent edges of either or each of them, and in the thickness thereof, magnetic elements such as permanent magnets or electromagnets 159—160. These magnetic elements may be continuous over the entire length of the aprons and/or apron sections, or localised here and there.

Use might likewise be made—possibly by way of an addition—of a retractable magnetic device. The latter might be made in an extremely simple manner, as summarily illustrated in FIGURES 2 and 7. To this end, the girders constituting the pillars 156 would each have an orifice in their upper portion; all these orifices would be aligned and passed through by a shaft 161; keyed onto the latter would be overhanging arms 162, the free ends of which would be joined by a sectioned side girder 163 serving as a support for one or several electromagnetic devices 164. This device will preferably be continuous and the windings of the electromagnets will be fed by an electrical circuit controlled by a hand switch capable of being conveniently operated to secure and release respectively the plate T. This retractable device will preferably be operated by hand through the intermediary of a crank wheel 165 connected to the aforesaid common shaft 161 by any appropriate kinematic means (not shown) such as for example conical gears and suitable linkages.

The functioning of this machine is substantially as follows: the plate T is placed correctly on the apron 146 and apron sections 155. Its position is correct when the line of cut is juxtaposed to the continuous space separating the apron and apron sections; it is then located exactly in the median plane of the grinding wheel 11. The

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plate T is firmly secured by the magnetic or electromagnetic elements. At the outset the casing A is located in the right-hand position, illustrated by solid lines in FIGURES 1 and 2. By operation of the switches for this purpose carried, for example, by the main control board 145, the circuits of the drive motor 7 of the casing A and of the drive motor 21 of the main shaft 20, are closed.

It is thus obtained that the casing A commences its translational movement from right to left by rotation of the toothed pinion 9 and its continuous engagement with the rack 10 integral with the rail 1. These elements constitute a reciprocating mechanism. Simultaneously the second motor constituting driving means, carried by the false casing A', drives the main shaft 20, which controls firstly the rotational movement of the grinding wheel 11 and secondly the oscillatory movement of the portal. The rotating mechanism produces the rotational movement of the grinding wheel by the driving of the spindle 12 of the grinding wheel through the intermediary of the pulleys 59—61 and of the belt 60. The oscillating mechanism produces the oscillatory movement of the portal, and consequently also of the grinding wheel, through the intermediary of the grooved pulley 45, of the shaft 40, of the disc 39, of the cranked disc 34, of the adjustable connecting-rod 33, of the connecting-rod 32 and of the bush 15. The latter is supported through the intermediary of the arms 18—19 on the bearings 22—23; simultaneously, the portal is continuously supported, by the smooth crowns 30—31, on the corresponding roller paths, 28—29 respectively, whilst the toothed crowns 24—25 engage with the corresponding racks, 26—27 respectively. In this manner, not only is the portal positively driven in its oscillatory movement, but it is likewise very accurately centred, supported and balanced, thus imparting to the grinding wheel maximum stability in its translation, rotation and oscillation. In its triple movement of advance, rotation and oscillation, the grinding wheel ploughs a furrow in the plate T if the latter is comparatively thick, or cuts it directly in the case of smaller thicknesses.

Whilst the grinding wheel is cutting, the diamond head 62—63 is set in alternating rotary movement by the fact that the grooved wheel 74 follows the oscillatory movements of the arm 18, whilst the cable 75 is independent of these oscillatory movements, whence results a frictional movement first in one direction then in the other, between the cable and the grooved wheel, thus bringing about the alternating rotation of the latter and in consequence the driving in the same direction of the slotted section 73, of the rod 64 and of the diamond head 62—63.

The variations in length of the cable 75, whilst maintaining sufficient tension between this cable and the grooved wheel 74, are rendered possible by the presence of the spring 77. This results in the grinding wheel 11 being continuously shaped during its cutting work. The lubricant is projected forcibly by the nozzles 116—117 at the point of attack of the grinding wheel. When the limit of travel is reached in the position shown in dotted lines in FIGURE 1, the beam 86 encounters the stop 97 and is forced by the latter to turn, driving the shaft 82 and the pawl 88, before being restored to its initial position by any suitable means of return. The pawl 88 in turn drives through a corresponding angle the ratchet wheel 83, which through the intermediary of the endless screw 84 and of the helicoidal wheel 85, causes the threaded rod 51 to turn about its axis. This rotational movement causes the special nut 46 to be raised by a proportional amount, driving the false casing A' in a circular movement about the shaft 58. The above constitute the first shifting means.

During this time, the casing A'' has been able to undergo a slight translational movement with reference to the special nut 46, which therefore renders possible

at the same time, the circular movement of the false casing A' and the strictly rectilinear movement of the special nut 46.

In this circular movement, the false casing A' has driven all the organs which it carries, in particular the oscillating portal, and hence also the grinding wheel 11. The latter is thus ready for a fresh run. Simultaneously, the needle 99 carried by the aforesaid beam 86 has opened the switch 100 and has closed the switch 101, which will reverse the direction of rotation of the motor 7. The above constitute the reversing means.

It follows that the casing A moves from left to right, whilst the grinding wheel effects a fresh cutting run. Moreover, the circular movement of the false casing A', which means also the shifting of the grinding wheel 11 towards the plate, must be accompanied by a corresponding shift of the shaping tool to make allowance for the wear of the grinding wheel. This shift is effected by the second shifting means, namely by the fact that the beam 86 has driven the helicoidal wheel 67 by a corresponding amount, through the intermediary of the endless screw 69, the chain wheel 71, the chain 72, the second chain wheel 81 and the shaft 82.

As it turned, the helicoidal wheel 67 shifted the externally threaded rod 65 axially by a corresponding amount. The latter shifts axially by a corresponding amount with reference to the boss 66, thus driving home the diamond head 62—63, which approaches by the amount corresponding to the radial wear of the grinding wheel. Similarly, each circular movement of the false casing A' must be accompanied by a relative readjustment of the nozzles 116—117 with reference to the grinding wheel in order to allow likewise for the reduction in diameter of the latter. This readjustment is effected automatically by the fact that, in its axial movement, the diamond head 62—63 drives the rod 64, the slotted section 73, the swivelling anchorage 125, and exerts a traction upon the cables 124—126, this traction being transmitted to the two tubular pipes 111—112 and also to the piping 116—117, which thereby moves closer by the appropriate amount to the periphery of the grinding wheel, so that its relative position with reference to the latter is virtually constant. When the casing A reaches its limit of return travel, the lever 92 encounters the stop 98. The latter forces the lever to turn about its shaft 93, driving the beam 86 through the intermediary of the connecting-rod 90, which sets going a fresh operating cycle such as has been described, the direction of rotation of the motor 7 being once more reversed by the operation of the switch 103 for that purpose through the intermediary of the needle 102. All the operations are repeated, and so on up to the total cutting-off of the plate T. The reversing movements might possibly be brought about manually by exerting traction on the handle 95.

The offcuts of the plate are supported by the apron sections 155. The cutting waste falls by gravity into the pit 137 and is collected into the shaft 139 by the rotating Archimedean screw 138. The setting in rotation of the said Archimedean screw may take place periodically, for example by the periodical manual operation of the cranked wheel 143 carried by the central control station 144.

It is self-evident that the construction of this machine may be varied within the scope of the inventive concept herein disclosed.

What I claim is:

1. Machine for cutting plates, particularly plates of hard metal, said machine comprising, in combination, at least one grinding wheel having a central rotation spindle, a rotating mechanism rotating said grinding wheel about said central rotation spindle, an oscillating mechanism oscillating said grinding wheel about an axis parallel to said central spindle, driving means driving simultaneously said rotating mechanism and said oscillating mechanism, a

reciprocating mechanism moving jointly said grinding wheel, said rotating mechanism and oscillating mechanism longitudinally along a line of cut formed by said grinding wheel upon a plate, reversing means automatically reversing the direction of the longitudinal movement, a shaping device continuously shaping said grinding wheel, a lubricating device continuously lubricating said grinding wheel, first shifting means shifting step by step said grinding wheel jointly with said shaping device and said lubricating device towards said plate at the end of each longitudinal movement along said line of cut, and second shifting means shifting said shaping device and said lubricating device toward said grinding wheel at the end of each longitudinal movement thereof to compensate for the peripheral reduction of said grinding wheel.

2. Machine according to claim 1, comprising a casing carrying said grinding wheel, said rotating mechanism, said oscillating mechanism, said reciprocating mechanism, said shaping device and said lubricating device, said machine further comprising guideways extending over a length of said plate and carrying said casing.

3. Machine according to claim 1, wherein said driving means comprise an electric motor having a shaft, wherein said rotating mechanism comprises a first transmission means intercoupling said shaft and said central rotation spindle of said grinding wheel, whereby said spindle and said grinding wheel are rotated when said shaft is rotated, wherein said oscillating mechanism comprises a portal device and a second transmission means, said portal device comprising a middle lever carrying said central rotation spindle and two lateral connecting-rods having articulated ends, said second transmission means intercoupling said shaft and said middle lever, whereby said portal device, said spindle and said grinding wheel are oscillated about said articulated ends of the connecting-rods when said shaft is rotated.

4. Machine according to claim 3, comprising a false casing, a mobile casing movable along said plate, said ends of said two lateral connecting-rods being articulated to said false casing, said false casing being housed and articulated in said mobile casing.

5. Machine according to claim 4, wherein said portal device comprises a tubular sleeve concentric with said central rotation spindle and joining the other ends of said two lateral connecting-rods, said tubular sleeve carrying said middle lever and being integrated with said central rotation spindle, whereby said spindle may freely rotate while being oscillated, said middle lever being articulated to said second transmission means, said tubular sleeve having a smooth ring and a toothed segment on either side of said middle lever, a smooth roller-way and a rack integral with said false casing, said ring and said segment being supported on said roller-way and said rack, respectively.

6. Machine according to claim 4, wherein said shaping device comprises a diamond head, a smooth rod having a longitudinally channelled section and carrying said diamond head, an externally threaded tubular element, said smooth rod extending longitudinally through said tubular element, a boss integral with one of said connecting-rods of said portal device; said tubular element being housed in said boss, a housing containing said boss, a helicoidal wheel fitted into said housing and engaging said tubular element so as to turn freely without being displaced axially; an endless screw, said helicoidal wheel engaging said endless screw, said endless screw comprising a spindle, said reversing means comprising a reversing element associated with said spindle and automatically operated at the limit of longitudinal travel of the grinding wheel, a grooved pulley connected with the said boss, whereby said pulley may turn, driving said smooth rod while permitting the latter to shift axially, said grooved pulley engaging the channelled section of said smooth rod, a cable engaged in said grooved pulley, one end of said cable being secured to said false casing, a spring secured to said false

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casing, the other ends of said cable being secured to said spring.

7. Machine according to claim 4, wherein said shaping device comprises a smooth rod and wherein said lubricating device comprises two mutually opposed nozzles, two pipes retained and guided by the lateral arms of one of said connecting-rods of said portal device, each nozzle being positioned at the end of a separate pipe, a hose for the delivery of the lubricant under pressure; said pipes being connected to said hose, a grooved pulley, two cables fixed at the axis of each of said two pipes, one of the ends of the two cables passing over said grooved pulley, the axis of said grooved pulley being integral with said false casing, and a swivelling anchorage provided at the lower extremity of the smooth rod of said shaping device, the other ends of the said cables being secured to two diametrically opposite points of said anchorage.

8. Machine according to claim 4, wherein said lubricating device comprises nozzles located so that their mouths are at a level slightly below the highest generatrix of said grinding wheel.

9. Machine according to claim 4, wherein said first shifting means comprises a small articulated lever carried by said false casing, a fixed end-of-travel stop coacting with said lever, a second end-of-travel stop; a small beam coacting with said second stop, another connecting rod connected with said small articulated lever and said beam, a pawl, a threaded rod, a nut, said threaded rod passing through said nut, a ratchet wheel driving rotationally said threaded rod, a box integral with said false casing, said nut being housed in said box, whereby upon each angular

end-of-travel movement, the false casing is driven by said nut in an angular movement in order to bring the grinding wheel into position for a fresh run.

10. Machine according to claim 4, wherein said second transmission means comprise a crank-stud, a connecting-arm having an end articulated to the end of said middle lever, and another end articulated to said crank-stud; a slide piece, a crank disc, said crank-stud being integral with said slide-piece and being guided diametrically in said crank disc, and an intercoupling device coupled with said crank disc and said motor shaft, the axis of said crank disc being driven through said intercoupling device by said motor shaft.

11. Machine according to claim 10 wherein the last-mentioned connecting-arm consists of two sections mutually fitted and integrated so as to vary its length, said crank-stud being radially displaceable to regulate its excentricity.

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