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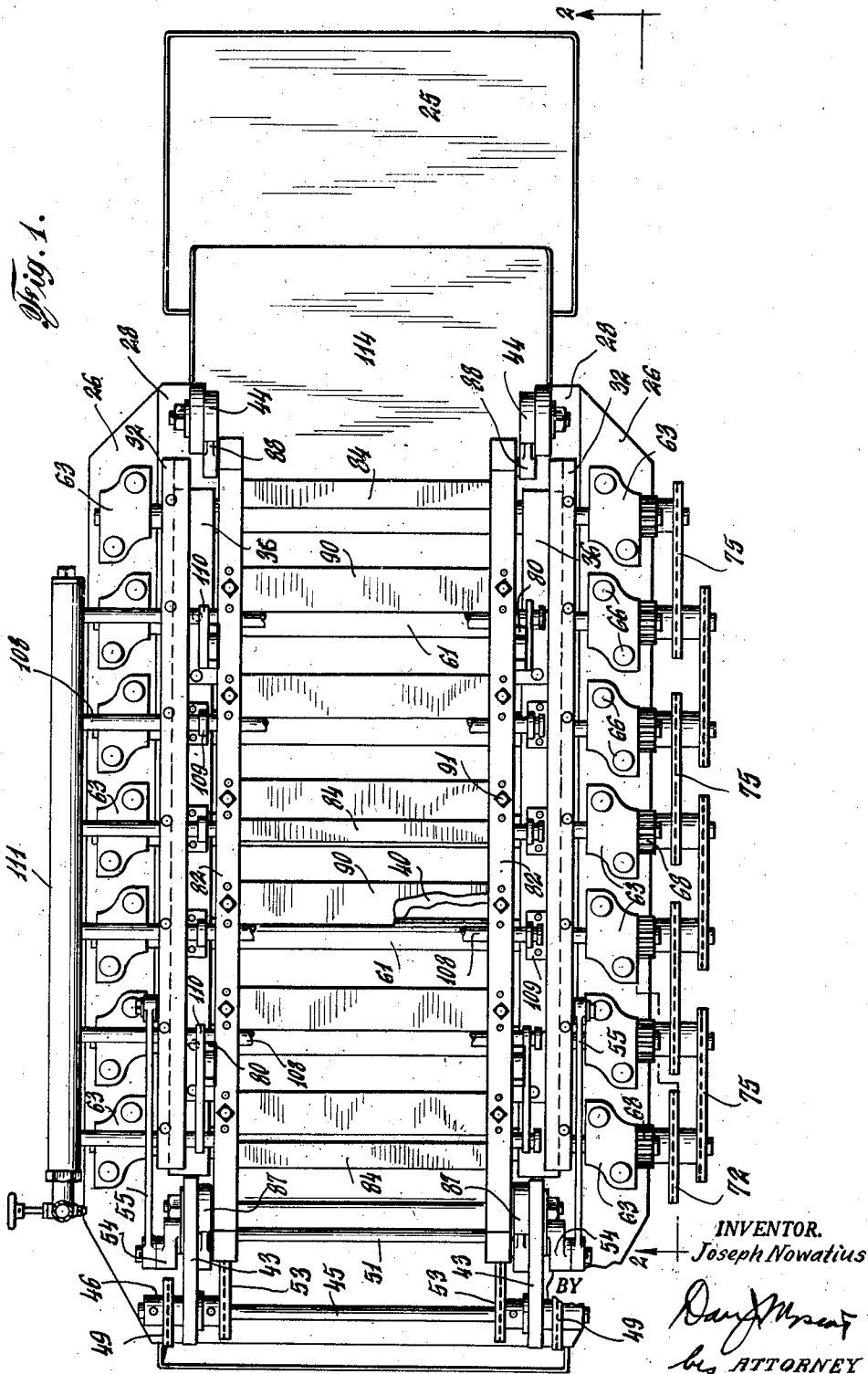
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APPARATUS FOR REMOVING MATTER FROM SURFACES OF ETCHED PLATES

Filed Nov. 23, 1944

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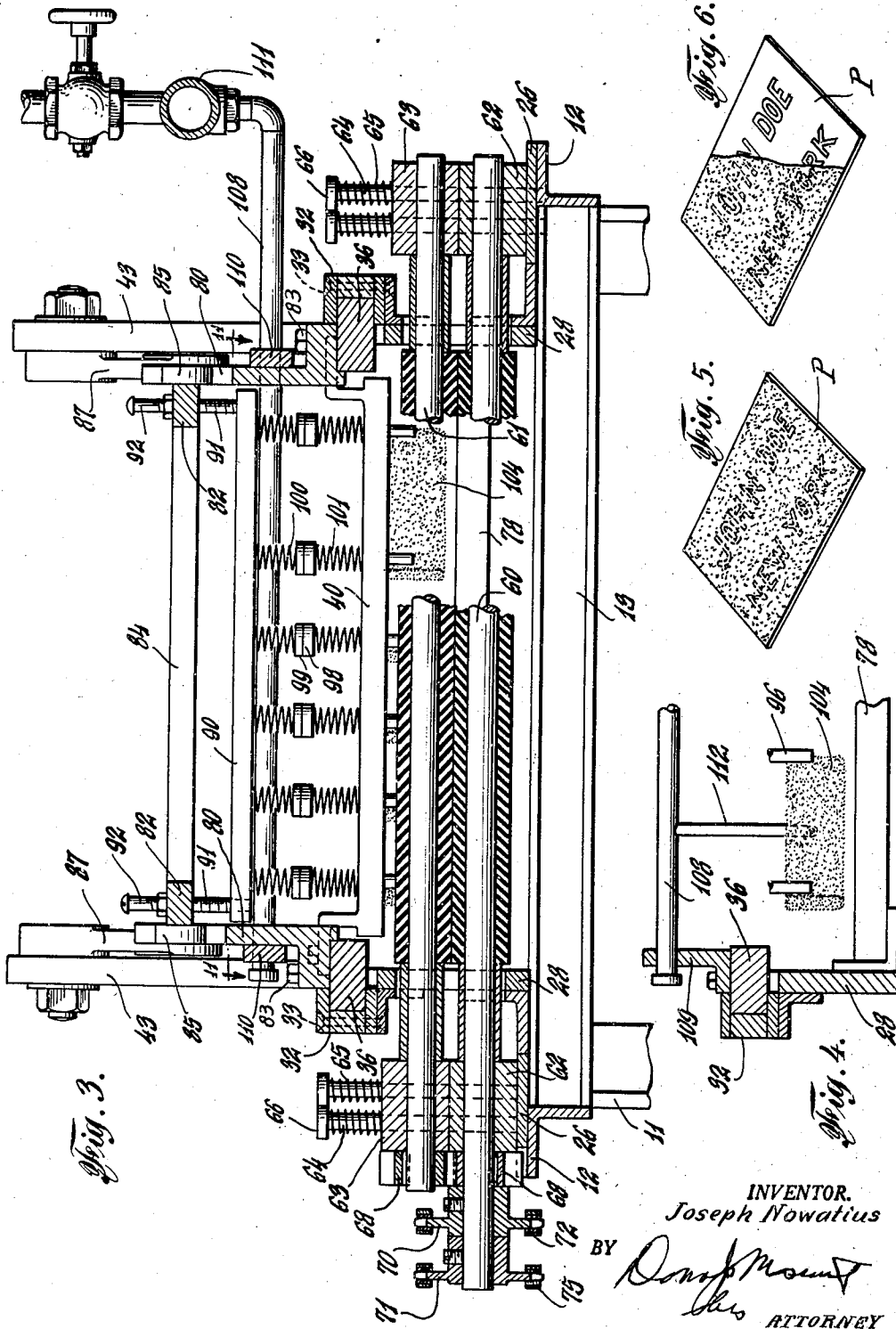
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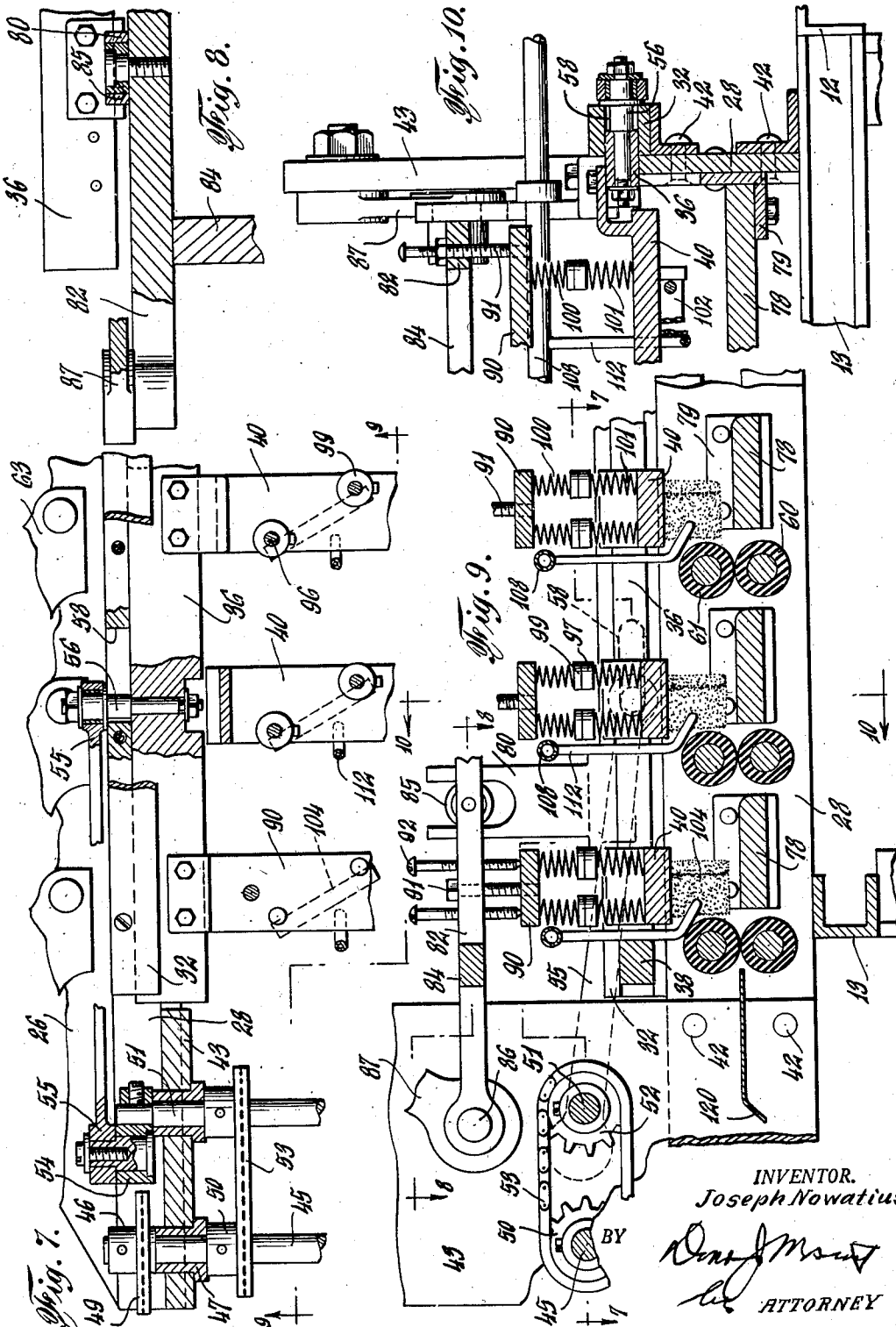
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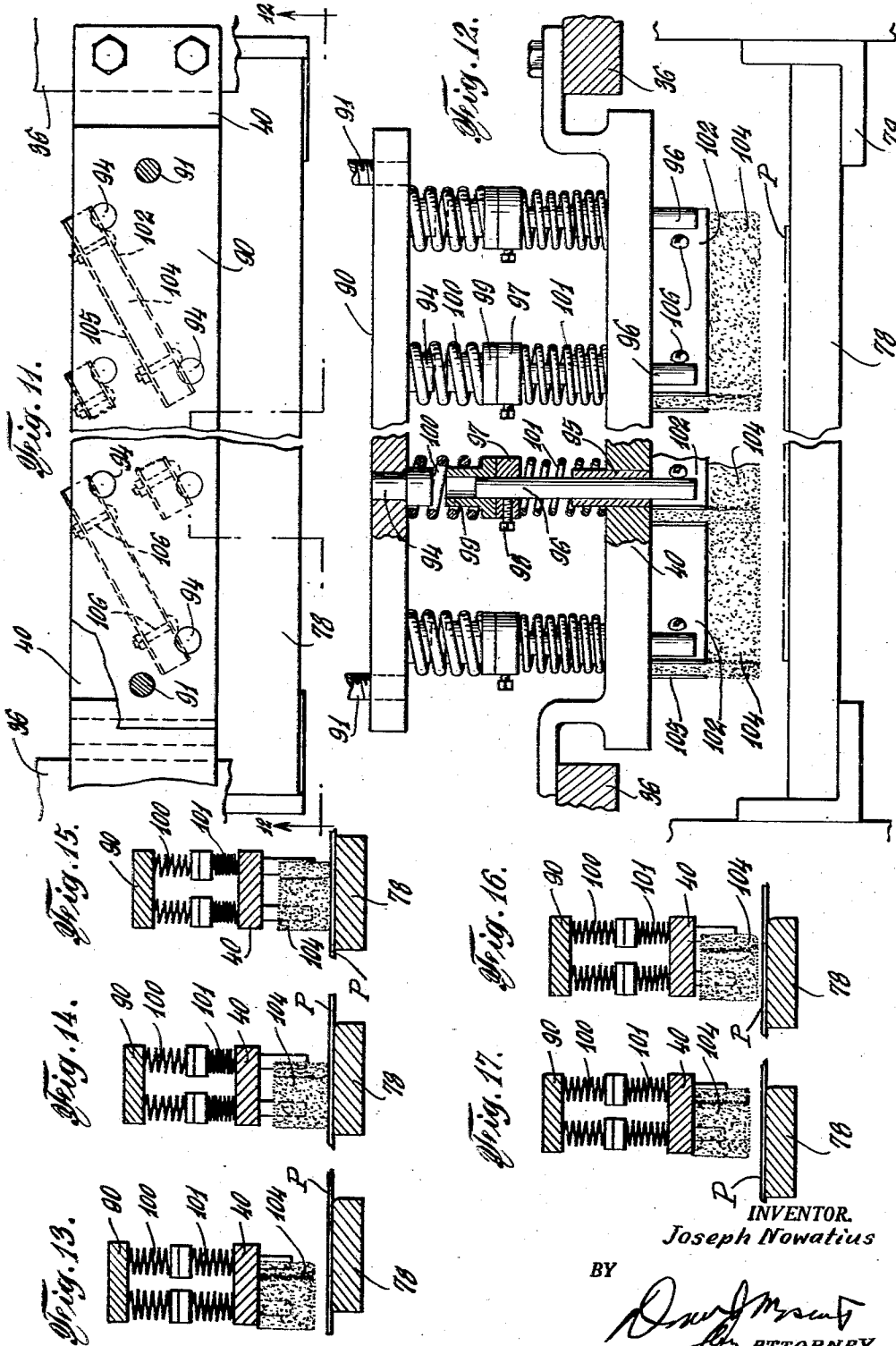
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UNITED STATES PATENT OFFICE

2,392,176

APPARATUS FOR REMOVING MATTER FROM
SURFACES OF ETCHED PLATESJoseph Nowatius, Elmhurst, N. Y., assignor to
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Application November 23, 1944, Serial No. 564,886

10 Claims. (Cl. 15—102)

This invention generally relates to the production of etched plates, particularly of those plates of utilitarian or decorative character having indicia, patterns or designs delineated against a suitable background. The invention is specifically directed to the provision of automatically functioning means for removing the matter adhering to the unetched surfaces, or highlights, of such plates, in a final phase of the treatment thereof.

As is well known to those skilled in the art, in the manufacture of plates of the aforementioned character, after the desired design has been imprinted on the plate surface and suitable protective asphaltum resist or like material has been applied to the design, the plate is subjected to the so-called baking operation and the unprotected portions thereof are treated in a suitable etching bath. A coating of enamel or lacquer is then applied to the entire surface of the plate, to cover the etched-out portions thereof as well as those portions that have not been affected by the etching bath being covered by the protective resist. Finally, the matter, enamel and underlying resist, adhering to the unetched portions of the plate is removed therefrom to expose said untreated portions and to provide the desired indicia or designs defined by the contrasting exposed untreated surfaces and enamel covered surfaces of the plate.

Heretofore, it has been customary to perform the last-mentioned operation manually, by repeatedly passing a scraper of suitable material across the plate surface, with sufficient pressure to remove the matter adhering to the unetched portions, which had been previously treated with a suitable softening liquid preparation.

Such a manual method obviously involves time-consuming operations and requires the use of comparatively skilled labor, all of which considerably affects the cost of manufacture of the plates. Aside from this, the manual method heretofore used does lead to entirely satisfactory results, as it is hardly possible for a workman, in the treatment of a considerable number of plates, to handle the scrapers in such a manner as to constantly apply an even pressure to the surfaces acted upon, so that production of articles of uniform quality cannot be insured.

Furthermore, it may sometimes happen that too much of the enamel covering the etched portions of the plates is inadvertently removed, or scratches or other marks marring the plate surface may be produced during the scraping with the resulting seriously defective articles and spoilage.

It is therefore the primary object of the invention to provide means for removing the matter adhering to the portions to be exposed of plates of the character described, whereby the unsatisfactory results inherent in the manual scraping methods heretofore employed are entirely eliminated, and finished etched plates are produced that possess a uniform degree of excellence not previously attainable.

Another object of the invention is to provide a machine embodying automatically functioning and continuously operating means whereby any number of plates may be successively treated, to obtain the aforementioned results, and the production of the finished articles greatly speeded up, as compared with the methods heretofore used, with the consequent reduction in the cost of manufacture, each plate being acted upon while advancing through the machine from an entrance point to a discharge point thereof.

A further object of the invention is to provide a machine having the aforementioned characteristics, which comprises a plurality of simultaneously actuated scrapers successively acting on a plate to be treated, during the travel of this latter from the entrance to the discharge end of the machine, with a predetermined constant contact pressure effective to remove the matter adhering to the portions to be exposed so as to insure a uniform action on any number of plates fed to the machine, means being provided to supply to the plates a suitable fluid for softening and conditioning the enamel coating thereof for removal in the zones of action of the scrapers.

It is also within the scope of this invention to provide adjustable means for controlling the movement of series of scrapers located in different zones of the machine so as to permit variable scraper action at different points of the travel of the plates.

The invention also contemplates the provision in a machine of the character described, of conveying and scraping means adapted for operation with plates of different widths and thicknesses. These and other related objects will be better understood in the following description of the invention.

In the drawings:

Fig. 1 is a top plan view of a machine according to the invention.

Fig. 2 is a side elevation of the structure of Fig. 1, partly in section along line 2—2 of said figure.

Fig. 3 is an enlarged transverse vertical section through the machine, on line 3—3 of Fig. 2, illustrating the mounting and arrangement of the

means for conveying the plates and of the means for actuating the scrapers, part of the structure being broken off to show one of the scrapers.

Fig. 4 is a fragmentary transverse vertical section, on line 4—4 of Fig. 2, showing one of the nozzles associated with the scrapers to supply softening fluid for the matter to be removed.

Figs. 5 and 6 illustrate a plate respectively prior to removal of the matter adhering to the portion to be exposed and after partial treatment thereof.

Fig. 7 is a fragmentary horizontal section through the machine, on line 7—7 of Fig. 9 in the direction of the arrows, illustrating details of the means for driving the machine slide.

Fig. 8 is a fragmentary top plan view, partly in section, on line 8—8 of Fig. 9.

Fig. 9 is a fragmentary vertical longitudinal section through the machine, on line 9—9 of Fig. 7, illustrating the scrapers and actuating means therefor, and their relation to the plate conveying and supporting means in one of the extreme or inoperative positions of the scrapers.

Fig. 10 is a vertical transverse section, on line 10—10 of Fig. 9.

Fig. 11 is a fragmentary plan view, in the plane of line 11—11 of Fig. 3 looking downwardly.

Fig. 12 is a side elevation, partly in section on line 12—12 of Fig. 11, illustrating in detail the mounting of the scrapers and the construction of the means for controlling the operation thereof.

Figs. 13, 14, 15, 16 and 17 diagrammatically illustrate the action of the scrapers on a plate and the various positions assumed by the scrapers and associated controlling elements during operation of the machine.

Referring now in detail to the drawings, and in the first place to Figs. 1 to 3, numeral 10 generally indicates a supporting frame or bed for the machine of the present invention, formed of suitably interconnected longitudinal angles 12 and transverse channels 13 mounted on legs 11. A supporting member 14, secured to the legs 11 underneath the bed 10, carries an electric motor 15 which is drivingly connected to a speed reducing gear mechanism mounted within the housing 16 and comprising a shaft 17 having fast thereon, outside the housing 16, a sprocket wheel 18. A horizontal shaft 20 is supported transversely of the machine, below the discharge end thereof, in bearings secured to a pair of the legs 11 and has fastened thereto, near one of its ends, a sprocket wheel 21 driven from the sprocket wheel 18 through a chain 22. A bracket 24 carries a tank 25 underneath the entrance end of the machine, for the purpose that will become later apparent.

A pair of flat bars or plates 26, superimposed upon and suitably secured to the machine bed 10, extend longitudinally along the opposite sides of the machine. Adjacent said bars 26, inwardly thereof, there are fastened to the bed 10 a pair of composite side members 28, substantially longitudinally coextensive with the bars 26, providing parallel walls along the opposite sides of the machine having upper outwardly extending portions defining plane horizontal supporting surfaces. Superimposed upon said horizontal surfaces of the members 28, are composite members 32, consisting of bars arranged to form a channel structure secured to the members 28, as by means of bolts 33, and providing a pair of tracks longitudinally of the machine.

Parallel bars 36 are slidably mounted in the tracks 32 and are interconnected at their ends

by transverse bars 38 (one of which is shown in section in Fig. 9) suitably secured thereto to provide a rigid structure. The bars 36 carry, intermediate their ends, a plurality of uniformly spaced transverse bars 40 (see Figs. 3, 7 and 9), the function whereof will become later apparent, which extend in a horizontal plane below the plane of the bars 36 and have bracket-forming ends fastened to these latter. The complex of elements 36, 38, 40 is subjected during operation of the machine to a continuous reciprocatory motion through kinematic connections to be described, and may be designated as a "reciprocatory slide."

Uprights 43 are secured to the members 28, at the end of the machine from which the treated plates are discharged, as by means of rivets 42 (see Fig. 10), while uprights 44 are similarly secured to the members 28 at the opposite or entrance end of the machine.

A horizontal shaft 45 is rotatably mounted in bearings 47 of the uprights 43 and has fast thereon, at its opposite ends, sprocket wheels 46 driven from a pair of sprocket wheels 48, mounted on the aforementioned shaft 20 carried by the legs 11, through chains 49. A further pair of sprocket wheels 50 is carried by the shaft 45 inwardly of the uprights 43. A second shaft 51 is likewise journaled in the uprights 43, as at 59, and carries sprocket wheels 52 aligned with the sprockets 50 and connected therewith by means of chains 53.

At the ends of shaft 51 outwardly of the uprights 43, are mounted cranks 54 having pivoted thereon connecting rods 55 provided with end pivots 56, which pass through slots 58 in the tracks 32 and are secured to the aforementioned bars 36 of the reciprocatory slide mounted in said tracks. The structure described is shown in Figs. 1 and 2, and the details thereof are best illustrated in Figs. 7, 9 and 10.

As will be apparent from the foregoing, operation of the motor 15 imparts to the bars 36 and other elements of the slide, through the connections described, a continuous reciprocatory motion in a horizontal plane, for the purpose and with the results hereafter disclosed.

A plurality of uniformly spaced pairs of superimposed rollers 60, 61, having a lining of rubber or similar material, are mounted transversely of the machine below the reciprocatory slide. Said rollers extend through suitable openings in the members 28 and are journaled at their ends in pairs of superimposed blocks 62, 63, which latter are mounted on the plates 26 at the opposite sides of the machine. Pairs of vertical rods 64 are fastened to the plates 26 and extend through and beyond the superimposed blocks 62, 63 to maintain the same in fixed position relative to the plates 26 and in vertical alinement with one another. Springs 65 surround the rods 64 between the heads 66 of these latter and the upper face of the blocks 63, to maintain these latter in surface engagement with the underlying blocks 62, in which position of the blocks the upper rollers 61 will contact the lower rollers 60. As will be evident, the springs 65 will permit sufficient upward displacement of the upper blocks and roller journaled therein to allow of the passage of the plates to be treated between the rollers, while insuring driving contact of the rubber surface of the rollers with the plates in the simultaneous rotation of the rollers, effected as follows.

Both the rollers 60 and 61 of each pair are provided at one end thereof, outwardly of the ad-

adjacent blocks 62, 63, with pinions 68 that are in constant mesh, and the lower roller 60 of each pair extends beyond its pinion 68 to mount a pair of juxtaposed sprocket wheels 70, 71 fast thereon (see Fig. 3). The inner sprocket wheel 70 of the first roller 60 from the discharge end of the machine is driven, through a chain 72, from a sprocket wheel 74 fastened to the aforementioned shaft 20, and all the following rollers 60, to the entrance end of the machine, are driven in synchronism with the first roller through a plurality of chains 75 interconnecting the sprocket wheels thereof in the manner shown in Fig. 2, all the upper rollers 61 being, of course, simultaneously and synchronously rotated in opposite direction to the rollers 60 by means of the meshing pinions 68. As will be apparent, the rotation of the pairs of rollers 60, 61 will take place simultaneously with the reciprocatory motion of the slide, both being driven from the same shaft 20 through the respective connections described.

A plurality of stationary bars 78, suitably secured to angle irons 79 fastened to the members 28, extend transversely of the machine intermediate the pairs of rollers with their upper face in the plane of the line of contact of the rollers, to provide support for the plates to be treated in the travel of these latter through the machine brought about by the action of the rollers thereon (see particularly Figs. 3 and 9).

Each of the bars 36 of the reciprocatory slide has bolted thereto, as at 83 (Fig. 3), a pair of members or uprights 80 equally spaced from the opposite ends of the bars, said members being formed with a forked terminal upper portion. A pair of parallel bars 82 extend, above the reciprocatory slide, from the uprights 43 to the uprights 44 inwardly thereof and of the bars 36 of the slide, and are interconnected by transverse bars 84 to form a rigid frame structure which may be termed as an "oscillatory frame" by reason of the motion imparted thereto during the operation of the machine. Each of the bars 82 of said frame carries a pair of annular elements, or rollers, 85 rotatably mounted, as shown in detail in Fig. 8, on studs fixed to the bars and received within the aforementioned forked portion of the members 80. The bars 82 are pivotally supported at their opposite ends, as at 86, to the lower ends of downwardly extending rockable arms 87, 88 pivotally connected to the uprights 43, 44, respectively.

As will be evident, the bars 82 are therefore operatively associated with the reciprocatory slide for synchronized movement therewith, through their rollers 85 engaged by the members 80 of the bars 36, and the bars 82 are caused during each stroke of the reciprocatory slide in either direction to move longitudinally with this latter, while being simultaneously gradually vertically displaced relative thereto in opposite direction owing to the oscillation of the supporting arms 87, 88 concurrent with the longitudinal movement of the bars. Obviously, any point of the bars 82, or any element rigidly carried thereby, will move during reciprocation of the slide in a vertical plane and along an arcuate path between two extreme, or outermost and uppermost, positions.

Underneath the bars 82 and above the bars 40 of the reciprocatory slide with which they are vertically aligned, there are provided transverse horizontal bars 90, connected to the bars 82 and vertically adjustable relative thereto by means of

bolts 91 threaded through the bars 82 and into the bars 90 (see particularly Figs. 3 and 9). The pairs of screws 92, shown in Fig. 9 adjacent the bolts 91, cooperate with these latter to maintain the bars 90 in adjusted position and oppose upward thrusts exerted on the bars during operation of the machine.

Reference will now be had particularly to Figs. 11 and 12, from which it will be seen that each bar 90 carries a number of downwardly projecting studs 94 disposed along parallel lines longitudinally thereof. Bushings 95 are mounted in each bar 40 in vertically spaced relation to the studs 94, and slidably receive and guide rods 96 which extend downwardly beyond the bushing and the bar 40 and upwardly towards the studs. Each of the rods 96 carries at its upper end a collar 97, fastened thereto by means of a set screw 98, and a flanged sleeve 99 superimposed upon said collar.

A heavy compression spring 100 is mounted on each stud 94 and associated sleeve 99, between the flange of the sleeve and the underside of the bar 90, while a comparatively weaker spring 101 surrounding the bushing 95 and the rod 96 is disposed between the collar 97 and the upper face of the bar 40. Plates 102 are arranged underneath the bar 40, at an angle to the longitudinal axis thereof, each plate being suitably secured, as by welding, to the projecting portions of a pair of rods 96. A scraper 104, preferably consisting of a block of hard felt, is mounted between each plate 102 and a plate 105 connected thereto by means of bolts 106 passing through the scraper.

The arrangement and dimensions of the elements of the structure just described is such that, in the position reached by the oscillatory frame at the end of each stroke of the associated reciprocatory slide in one direction, the bars 90 of the oscillatory frame will have moved to an extreme (uppermost and outermost) position, wherein they are vertically spaced from the vertically stationary bars 40 of the slide by such a distance that the spring 100 are substantially not under load; therefore, the weaker springs 101 are allowed to displace upwardly the associated collars 98 and the rods 96 to which these latter are fastened, to move the scrapers 104 to an uppermost inoperative position wherein the scrapers are vertically spaced, as indicated in Figs. 12 and 13, from the underlying stationary bars 78 by a distance sufficient to prevent contact of the scrapers with a plate P superimposed upon said bars. If the movement of the slide has been to the left of the machine as shown in Fig. 9, the scrapers 104, being associated with the slide for conjoint longitudinal movement therewith, will also have moved between adjacent pairs of rollers 60, 61 to an outermost position to the left relative to the bars 78, as illustrated in the showing of Figs. 9 and 13.

Assuming that the machine is in operation, during the following stroke of the reciprocatory slide in the opposite direction, or to the right, the oscillatory frame will gradually move downwardly; in the ensuing downward movement of the bars 90 toward the bars 40, concurrent with the synchronous longitudinal displacement of said bars 90 and 40, the springs 101 will gradually yield to the heavier springs 100, so that the scrapers are moved downwardly, while advancing from the left to the right, to the position indicated in Fig. 14 wherein they come into contact with the surface of a plate positioned on the bars 78. The arrangement of the elements may be

such as to cause this contact to be made in advance of the moment in which the bars 90 complete their downward movement, the heavy springs 100 yielding in the latter part of the descent of the bars.

At the end of their downward movement, the bars 90 will be aligned with the stationary bars 78, and the scrapers will have traveled half the distance between their outermost opposite positions relative to the bars 78, as shown in Fig. 15. The vertical displacement of the bars 40 and scrapers 104 has been somewhat exaggerated in the figures, for clarity of illustration.

As will be apparent, in the continuing movement of the elements to the right the bars 90 will then begin to rise, the scrapers remaining in contact with the surface of the plate P until the elements have reached a position to the right corresponding to that of Fig. 14, after which the springs 101 will gradually be allowed to expand to withdraw the scrapers from the plate and return the same to an uppermost inoperative position, as illustrated in Figs. 16 and 17.

Since the bars 90 are vertically adjustable relative to the bars 40, it is evident that the initial vertical spacing of the scrapers relative to the underlying stationary bars 78 may be varied as desired, to determine different points of initial contact, and therefore different contact pressure and areas, of the scrapers with a plate of a predetermined thickness travelling on the bars 78, as well as to permit proper action of the scrapers on plates of different thicknesses. Preferably, the bars 90 will be so adjusted from the entrance to the discharge ends of the machine as to provide a gradually decreasing contact pressure in the progression of a plate through the machine.

A plurality of pipes 108 extend transversely of the machine adjacent the bars 90 and are carried for movement with the reciprocable slide by supports 109 bolted to the bars 36, or by blocks 110 fastened to the aforementioned members or uprights 80 (see particularly Figs. 1, 3 and 4). Said pipes 108 are connected to a manifold 111 to which there is continuously delivered, during operation of the machine, from a source of supply and through flexible connections not shown, an appropriate solvent or dispersing liquid agent adapted to soften the matter to be removed by the action of the scrapers from the unetched surfaces or highlights of the plates that have to be exposed.

Nozzles 112 extend downwardly from the pipes 108 toward the scrapers 104, and have their ends set at a convenient angle to direct the softening liquid upon the scrapers and the surface of the plates travelling underneath these latter (Figs. 4 and 9). The liquid discharged from the nozzles, besides conditioning for removal the matter adhering to the surfaces of the plates to be scraped, is effective to drive off the removed matter which, together with the liquid, passes into a tank, not shown, located underneath the machine bed and thereafter is suitably drained therefrom.

The operation of the machine will be evident from the foregoing description. The plates P, coated with enamel upon their entire surface including the resist-covered unetched portions thereof, are fed to the first pair of rollers from which they will be gradually conveyed in a continuous uniform movement to the discharge end of the machine. In their gradual advancement, the plates pass underneath the series of scrapers in the zones comprised between the pairs of roll-

ers and are successively acted upon by the scrapers in the manner described.

By judiciously proportioning the sprockets through which the reciprocatory slide and the first roller 60 are respectively driven, such a ratio between the speed of reciprocation of the slide and the speed with which the plates are conveyed through the machine may be easily obtained as to insure proper contact of the scrapers with the entire surface of the plates travelling thereunder.

The enamel and underlying resist adhering to the unetched portions of the plates, properly conditioned by the softening liquid discharged thereon from the nozzles and, if desired, by previous immersion of the plates in the tank 25 filled with similar liquid, are easily removed. The pressure exerted by the scrapers may be readily controlled and graduated through the adjustment of the bars 90, and, as aforementioned, the scrapers may be so adjusted as to provide a comparatively rough action in an initial phase of the progression of the plates, sufficient to insure the removal of a considerable portion of the matter adhering to the higher surfaces of the plates, followed by a gradually decreasing scraper pressure effective to completely expose said surfaces without adversely affecting the enamel applied to the etched lower plate portions.

Because of the possibility of precisely controlling the pressure exerted by the scrapers and because of the character of the movement imparted thereto, the action of the scrapers essentially differs from that obtained in a manual operation, and leads to results not heretofore attainable.

While I have described the invention substantially with reference to a preferred embodiment thereof, it is to be understood that changes and modifications may be made in the structures illustrated in the drawings without departing from the spirit of the invention or exceeding the scope of the claims.

I claim:

1. A machine for treating etched plates to remove matter adhering to the surface of the unetched portions thereof, in a final phase of the production of such plates, comprising means for conveying a plate through the machine in a continuous movement, a plurality of scrapers disposed at spaced intervals along the machine transversely thereof, said scrapers being movable in opposite directions longitudinally of the machine between two extreme inoperative positions along a curved path to successively contactingly traverse the surface of the unetched portions of said plate, in the advancement of this latter through the machine, in a predetermined zone of their travel to progressively remove the matter adhering to said surface, and means functioning simultaneously with the plate-conveying means for continuously actuating said scrapers during operation of the machine.

2. A machine for treating etched plates to remove matter adhering to the surface of the unetched portions thereof, in a final phase of the production of such plates, comprising means for conveying a plate through the machine in a continuous movement, a plurality of scrapers disposed at uniformly spaced intervals along the machine transversely thereof, said scrapers being movable in opposite directions longitudinally of the machine between two extreme inoperative positions along a curved path to successively contactingly traverse the surface of the unetched portions of said plate, in the advancement of this latter

through the machine, in a predetermined zone of their travel, means functioning simultaneously with said plate-conveying means for continuously actuating said scrapers, and means for applying to the plate in the zones of action of the scrapers a fluid adapted to soften the matter adhering to the plate surface contacted by the scrapers, to condition said matter for removal by the scrapers.

3. A machine for treating etched plates to remove matter adhering to the surface of the unetched portions thereof, in a final phase of the production of such plates, comprising a plurality of continuously driven spaced pairs of rollers adapted to convey a plate through the machine in a continuous movement, an oscillatory frame, a plurality of series of scrapers disposed at spaced intervals transversely of the machine in the zones of this latter intermediate said pairs of rollers, the scrapers of each series being movable in opposite directions longitudinally of the machine between two extreme inoperative positions, means controlled by said oscillatory frame for causing the series of scrapers to follow a curved path during reciprocation between said extreme inoperative positions to successively contactingly traverse the surface of the unetched portions of said plate, in the passage of this latter between the pairs of rollers, in a predetermined zone of their travel, and means functioning simultaneously with the plate-conveying rollers for continuously actuating said series of scrapers and said oscillatory frame during operation of the machine.

4. A machine for treating etched plates to remove matter adhering to the surface of the unetched portions thereof, in a final phase of the production of such plates, comprising means for conveying a plate through the machine in a continuous movement, a plurality of scrapers disposed at spaced intervals along the machine transversely thereof, said scrapers being movable in opposite directions longitudinally of the machine between two extreme inoperative positions along a curved path to successively contactingly traverse the surface of the unetched portions of said plate, in the advancement of this latter through the machine, in a predetermined zone of their travel to progressively remove the matter adhering to said surface, and a mechanism operated simultaneously with the plate-conveying means for continuously actuating said scrapers during operation of the machine, said mechanism comprising means associated with the scrapers adjustable to provide different extreme inoperative positions of these latter, whereby to control the area and pressure of contact of the scrapers with the aforementioned surface of the plate traversed by the scrapers.

5. A machine for treating etched plates to remove matter adhering to the surface of the unetched portions thereof, in a final phase of the production of such plates, comprising a plurality of continuously driven spaced pairs of rollers adapted to convey a plate through the machine in a continuous movement, an oscillatory frame, a plurality of series of scrapers disposed at spaced intervals transversely of the machine in the zones of this latter intermediate said pairs of rollers, the scrapers of each series being movable in opposite directions longitudinally of the machine, means controlled by said oscillatory frame for causing the series of scrapers to follow a curved path in their movement longitudinally of the machine to successively contactingly traverse the surface of the unetched portions of said plate in the passage of this latter between the pairs of rollers, and a mechanism continuously operated simultaneously with the plate-conveying rollers

for actuating said series of scrapers, said mechanism comprising means associated with the scrapers adjustable to control the pressure exerted by the scrapers while contactingly traversing the aforementioned plate surface.

6. A machine for treating etched plates to remove matter adhering to the surface of the unetched portions thereof, in a final phase of the production of such plates, comprising a plurality of continuously driven spaced pairs of rollers adapted to convey a plate through the machine in a continuous movement, a plurality of series of scrapers disposed at spaced intervals transversely of the machine in the zones of this latter intermediate said pairs of rollers, the scrapers of each series being movable in opposite directions longitudinally of the machine between two extreme inoperative positions along a curved path to successively contactingly traverse the surface of the unetched portions of said plate, in the passage of this latter between said pairs of rollers, in a zone of their travel intermediate said extreme inoperative positions and a mechanism for continuously actuating said scrapers during operation of the machine simultaneously with the plate conveying rollers, said mechanism comprising means associated with the scrapers adjustable to provide different extreme inoperative positions of these latter, whereby to control the area and pressure of contact of the scrapers with the aforementioned surface of the plate traversed by the scrapers.

7. A machine for treating etched plates to remove matter adhering to the surface of the unetched portions thereof, in a final phase of the production of such plates, comprising a plurality of continuously driven spaced pairs of rollers adapted to convey a plate through the machine in a continuous movement, a plurality of series of scrapers disposed at spaced intervals transversely of the machine in the zones of this latter intermediate said pairs of rollers, the scrapers of each series being movable in opposite directions longitudinally of the machine between two extreme inoperative positions along a curved path to successively contactingly traverse the surface of the unetched portions of said plate, in the passage of this latter between said pairs of rollers, in a zone of their travel intermediate said extreme inoperative positions, a mechanism for actuating said scrapers comprising means associated with the scrapers adjustable to provide different extreme inoperative positions of these latter, whereby to control the area and pressure of contact of the scrapers with the aforementioned surface of the plate traversed by the scrapers, means for continuously operating said mechanism during operation of the machine simultaneously with the plate-conveying rollers, and nozzles associated with the scrapers adapted to direct upon these latter a fluid for softening the matter adhering to the plate surface traversed by the scrapers to conditions said matter for removal, said fluid being continuously supplied to the machine during operation of the machine.

8. In a machine for treating etched plates to remove matter adhering to the surface of the unetched portions thereof, in a final phase of the production of such plates, means for conveying a plate through the machine in a continuous movement, a horizontal slide mounted for reciprocation longitudinally of the machine above the plane of movement of said plate, an oscillatory frame disposed above said slide for synchronized movement therewith, a plurality of scrapers ex-

tending transversely of the machine underneath the slide associated with this latter for reciprocation therewith longitudinally of the machine, and means actuated by said oscillatory frame for vertically displacing said scrapers between an uppermost and a lowermost position during their reciprocation conjointly with the slide, to cause the scrapers to contactingly traverse the surface of the unetched portions of the plate, during the advancement of this latter through the machine, in a fixed zone of their travel.

9. In a machine for treating etched plates to remove matter adhering to the surface of the unetched portions thereof, in a final phase of the production of such plates, a plurality of continuously driven spaced pairs of rollers adapted to convey a plate through the machine in a continuous movement, a horizontal slide mounted for reciprocation longitudinally of the machine above the plane of movement of said plate, an oscillatory frame disposed above said slide for synchronized movement therewith, a plurality of spaced series of scrapers extending transversely of the machine underneath the slide between said pairs of rollers, all of said scrapers being associated with the slide for reciprocation therewith longitudinally of the machine, a plurality of rigid members movable with said oscillatory frame and means actuated by said members for vertically displacing said series of scrapers in opposite directions relative to the slide during their reciprocation conjointly with this latter, to cause the series of scrapers to successively contactingly traverse the surface of the unetched portions of the plate, during the advancement of this latter between the pairs of rollers, in a zone of their travel, to progressively remove the matter adhering to said surface, the aforementioned rigid members movable with the

oscillatory frame being vertically adjustable relative to the same to vary the amount of vertical displacement of the scrapers relative to the slide thereby permitting to controllably vary the contact pressure of the scrapers on the plate.

10. In a machine for treating etched plates to remove matter adhering to the surface of the unetched portions thereof, in a final phase of the production of such plates, a plurality of continuously driven spaced pairs of rollers adapted to convey a plate through the machine in a continuous movement, a horizontal slide mounted for reciprocation longitudinally of the machine above the plane of movement of said plate, as oscillatory frame disposed above said slide for synchronized movement therewith, a plurality of spaced series of scrapers extending transversely of the machine underneath the slide between said pairs of rollers, all of said scrapers being associated with the slide for reciprocation therewith longitudinally of the machine, a plurality of rigid members movable with said oscillatory frame, means actuated by said members for vertically displacing said series of scrapers in opposite directions relative to the slide during their reciprocation conjointly with this latter, to cause the series of scrapers to successively contactingly traverse the surface of the unetched portions of the plate, during the advancement of this latter between the pairs of rollers, in a zone of their travel, to progressively remove the matter adhering to said surface, means for continuously actuating the slide and associated oscillatory frame in predetermined speed relation to the rollers, and means for supplying to the plate in the zones of action of the scrapers a fluid adapted to soften the matter to be removed by the scrapers.

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