

March 7, 1933.

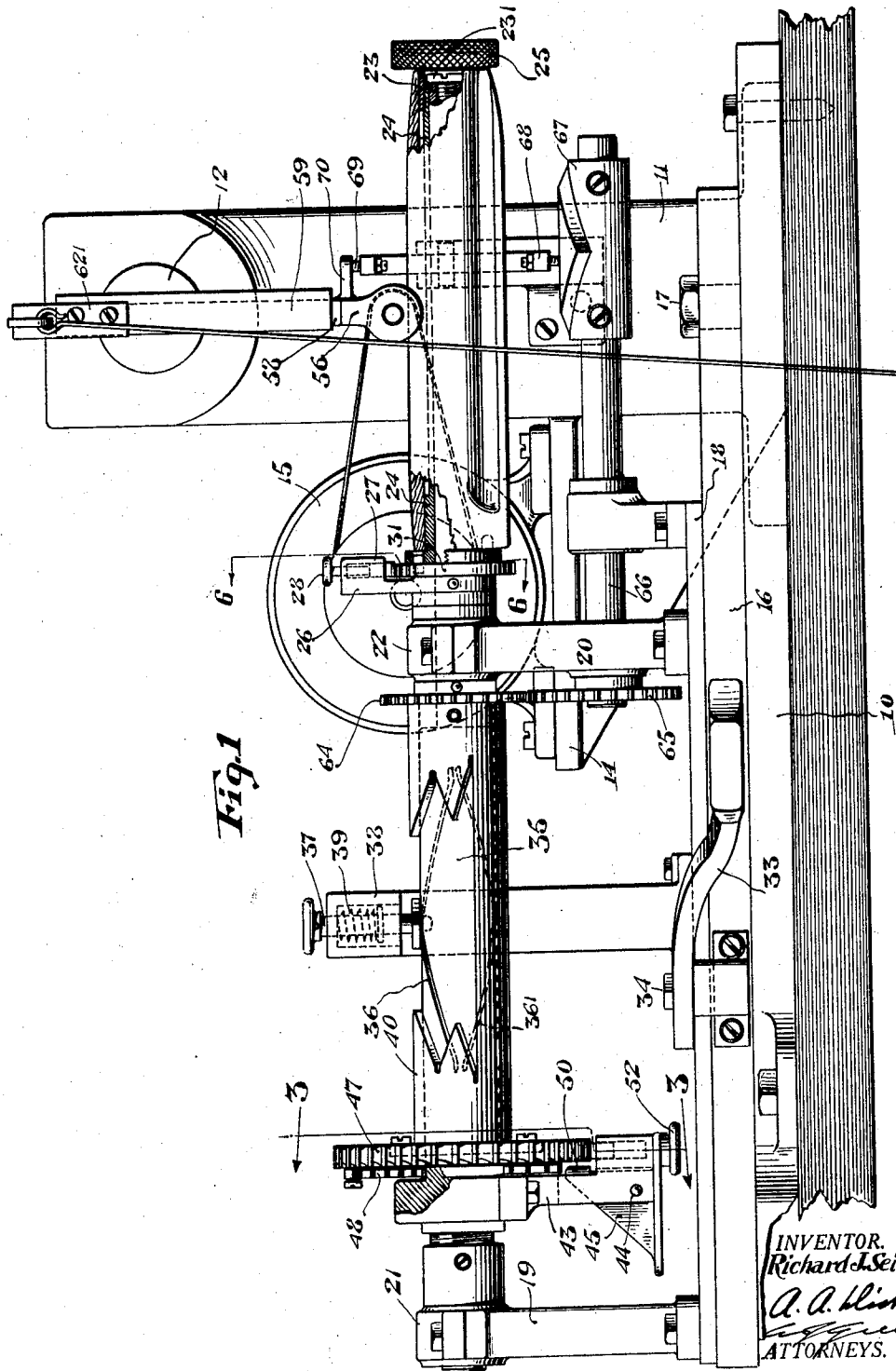
R. J. SEILER

1,900,203

CHECKERING MACHINE

Filed April 3, 1931

4 Sheets-Sheet 1



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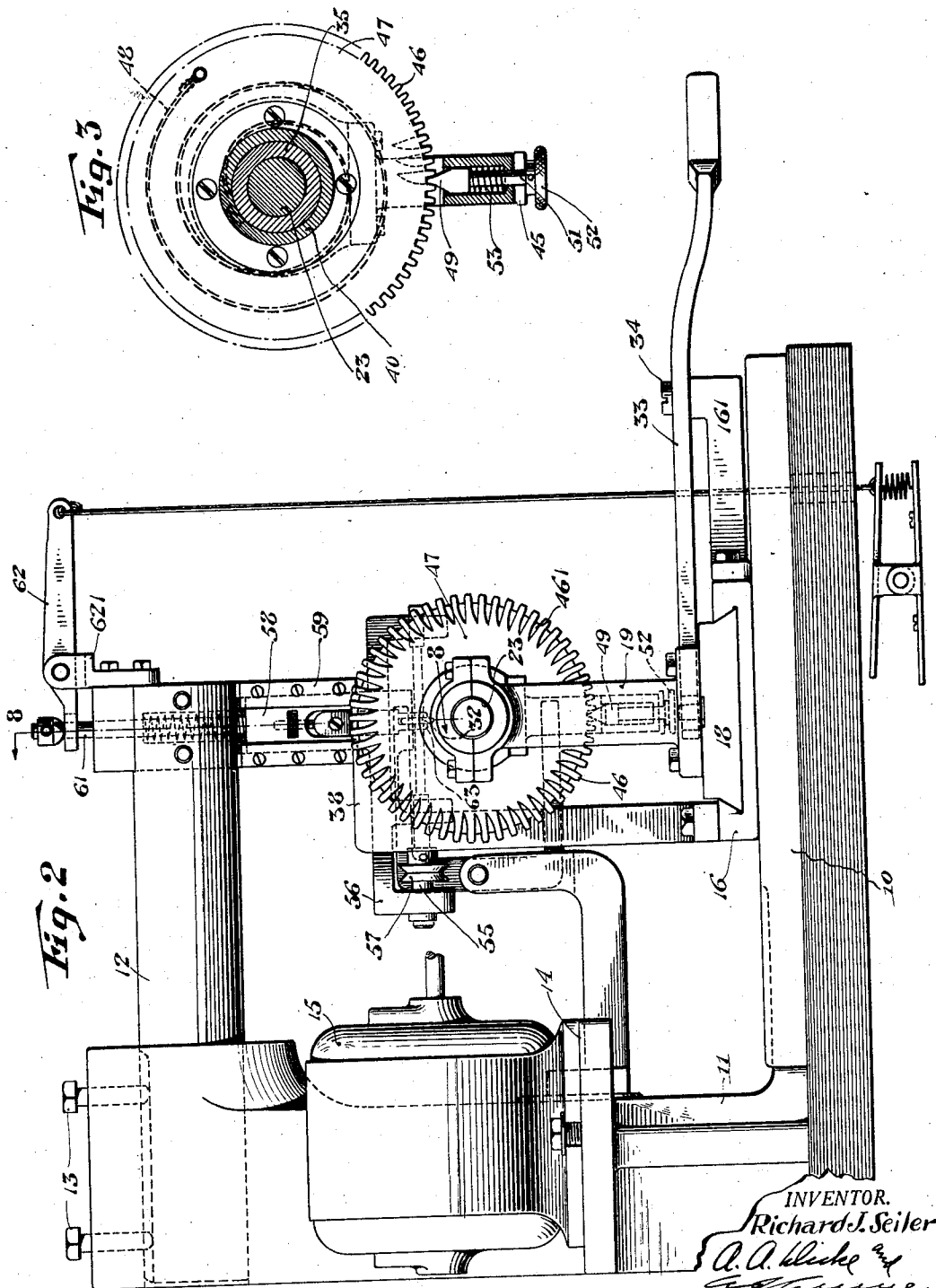
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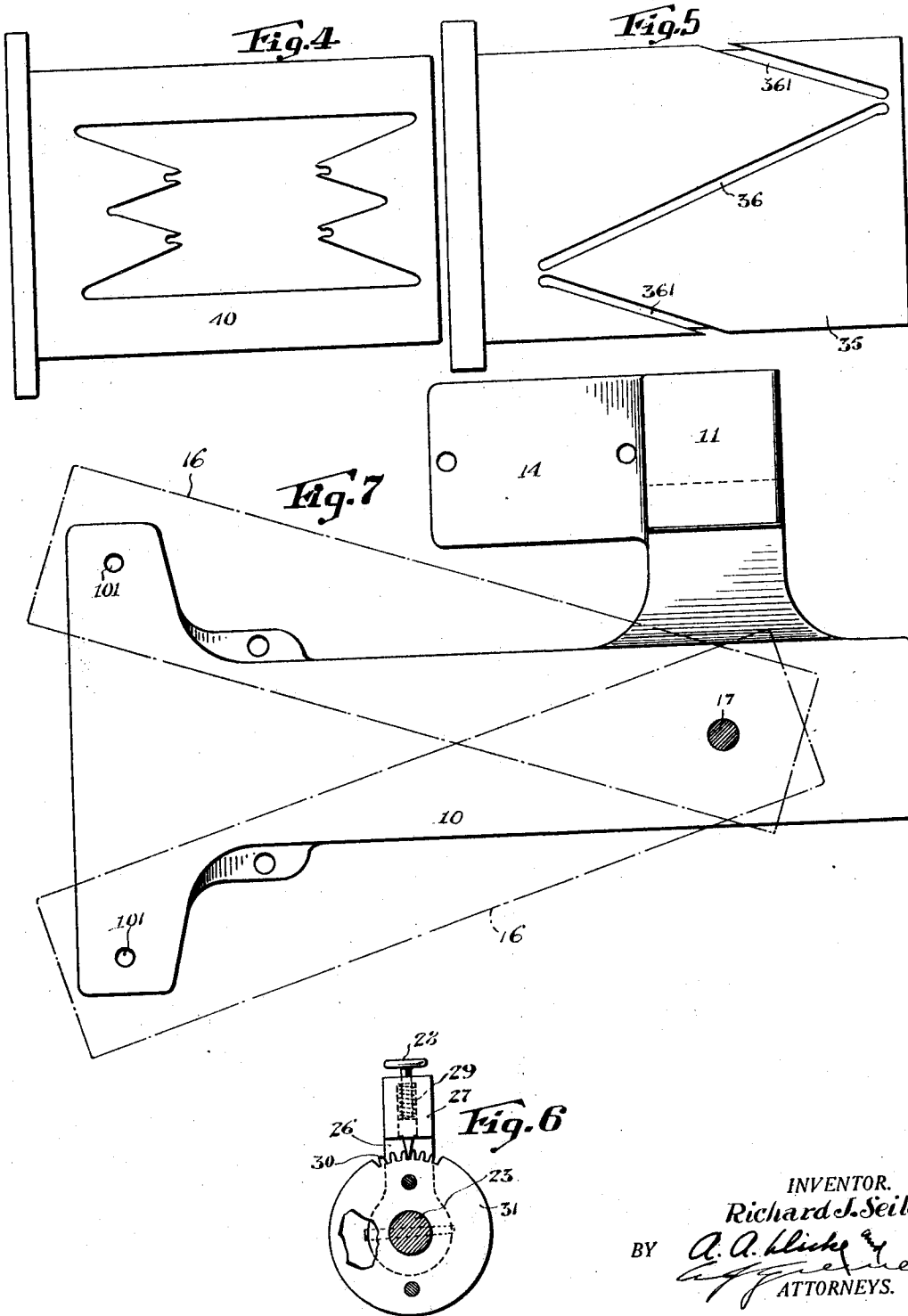
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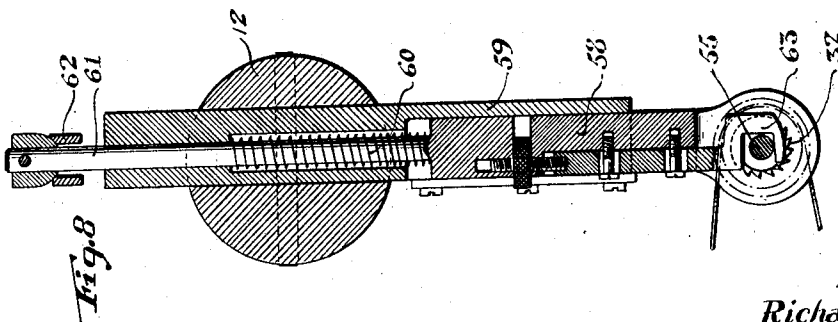
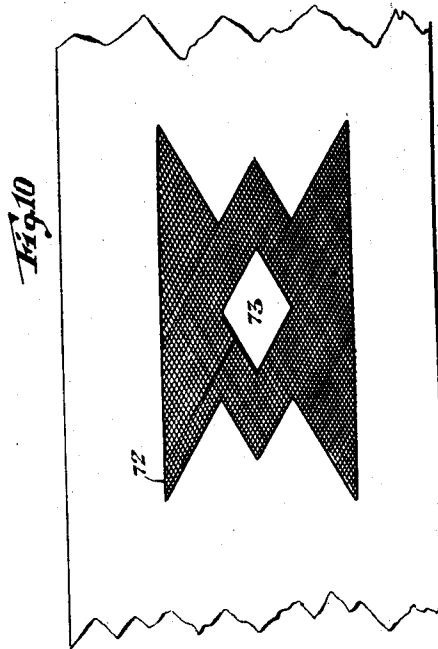
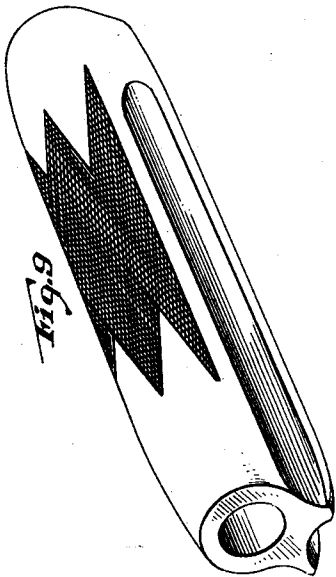
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

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CHECKERING MACHINE

Application filed April 3, 1931. Serial No. 527,461.

This invention relates to machines for cutting or impressing an ornamental design upon a surface. The particular embodiment thereof which has been selected for the purpose of illustration is a machine for forming upon the curving surfaces of such articles of wood as the fore-ends of shoulder guns an ornamentation consisting of a plurality of series of intersecting parallel grooves. Such ornamentation is commonly referred to in this art as "checkering". In the past all such checkering has been done by the use of a few types of manual tools in the hands of skillful operators. The present invention contemplates a semi-automatic machine for this purpose, said machine consisting essentially of work-holding, rotating and traversing devices, equipped with suitable index mechanism and suitably presenting the work to a grooving tool; together with novel supporting, actuating and controlling devices for such tool.

In the drawings:

Fig. 1 is a side elevation of the novel machine.

Fig. 2 is an end elevation thereof.

Fig. 3 is a section substantially on the line 3—3 of Fig. 1.

Fig. 4 is a development of the pattern controlling sleeve.

Figure 5 is a development of a section of the work rotation controlling sleeve.

Fig. 6 is a section substantially on the line 6—6 of Fig. 1.

Fig. 7 is a plan of the base plate, illustrating the shifting of the work-holding mechanism to different angular positions relative to the cutter.

Fig. 8 is an enlarged sectional elevation of the cutter supporting and controlling device substantially on the line 8—8 of Fig. 2.

Fig. 9 is a perspective of a fire-arm fore-end checkered upon the machine of the present invention.

Fig. 10 is a fragmentary development of the surface of a fore end checkered in a pattern differing slightly from that shown in Fig. 9.

The working parts of the machine are supported upon a frame comprising a base plate 10, an upright post 11, and an arm 12 extending horizontally from the upper part of said

post and preferably adjustably secured therein by suitable means, such as set screws 13. The post 11 is provided with a bracket 14 adapted to support a motor 15. The work holding and moving mechanism is mounted on a bed plate 16, which is pivoted at 17 to the frame base 10, and adapted to move relative to the base 10 about the pivot 17 between the limiting positions indicated in Fig. 7. The end of the base 10 is suitably widened as shown in Fig. 7 to provide the proper support for the mechanism supporting bed plate 16 in all positions, and suitable means, such as apertures 101 adapted to receive a retractible pin or stud associated with plate 16, are provided for holding said plate in any desired position with respect to the frame base 10.

Formed in the bed plate 16 is a longitudinal dove-tail channel or guide-way adapted to receive a supporting base 18, movable longitudinally in said guide-way. Secured to the base 18 are posts 19 and 20 provided at their upper ends with bearing apertures or journals 21 and 22. Said journals receive an arbor 23 passing through the journals and extending beyond the post 20 for the purpose of forming a work support. For the purpose of illustration, the piece of work has been shown as a wood channel (Fig. 9) adapted for use as a gun fore-end and having a substantially arcuate exterior surface. The projecting end of arbor 23 carries a sleeve 24, retained thereon by suitable means, such as a screw 231 threaded into the end of arbor 23, of such size and shape as to support such a fore-end piece so that its exterior surface is substantially concentric with said arbor. The work is slid over the end of said sleeve and is secured by suitable means such as a nut 25, threaded upon the end of sleeve 24.

Between the posts 19 and 20, the arbor 23 carries work rotation and traverse controlling devices. The work supporting sleeve 24 may be permanently fixed to arbor 23 but, for reasons which will be hereinafter discussed, the sleeve 24 is preferably adjustably secured to the arbor 23 by suitable means, one form of which is illustrated in Fig. 6. In

this device, an arm 26 secured to the arbor 23 is provided with an enlarged head 27 apertured to receive a plunger 28 which is pressed inwardly by a spring 29. The inwardly projecting end of said plunger is of such shape as to be received between teeth 30 on a flange 31 secured to or integral with the work supporting sleeve 24. By retracting the plunger 28 to disengage the same from the teeth 30 the sleeve 24 may be adjusted relative to the arbor 23 and when the desired adjustment is made, the plunger 28 is permitted to engage between the proper teeth 30, after which the sleeve 24 rotates with the arbor 23.

A cutting wheel 32 (Fig. 8), supported, rotated and controlled in a manner to be hereinafter described, is located above the sleeve 24 in a position to operate upon the piece of work secured upon said sleeve. Said wheel is substantially in a plane of the longitudinal axis of the base 10; thus, when the work supporting and controlling mechanism is rotated upon the base 10, the work will be brought into an oblique position with respect to said wheel and thereby adapted to receive from said wheel the diagonally extending grooves illustrated in Figs. 9 and 10. The longitudinal position of the wheel is fixed and the work is simultaneously traversed and rotated beneath said wheel. For the purpose of traversing the work, the base 18 is provided with a suitable hand lever 33 pivoted at 34 on a bracket 161 secured to bed plate 16. As the work is traversed by the movement of hand lever 33, it is rotated through a device which is preferably constructed as follows: Upon the arbor 23 is supported a rotation controlling sleeve 35 provided with cam slots or grooves 36 and 361. For the purpose of producing the pattern of diagonal checkering illustrated in Figs. 9 and 10, said grooves are reverse spirals of uniform pitch, a development of which is illustrated in Fig. 5. The pitch of each spiral groove is determined with reference to the angle of the work to the plane of the cutting wheel, so that the resultant of the rotational and translational movements of any point upon the work is substantially a straight line in the plane of the cutting wheel. The two grooves correspond respectively to the two angular positions of the mechanism upon the base 10.

Each of the grooves 36 and 361 is adapted, when presented upon the upper part of sleeve 35, to receive the end of a plunger 37 mounted in a bracket 38 rigidly secured to the fixed bed plate 16 and urged inwardly by a spring 39. It is thus apparent that as the base 18 is advanced by the movement of the hand lever 33, or other suitable means, the arbor 23 with the work on sleeve 24 will be rotated by reason of the engagement of the stationary plunger 37 in the groove 36 of sleeve 35, which sleeve is fixed to the arbor 23.

For the purpose of limiting the forward and reverse movement of the mechanism in such manner as to determine, for example, the pattern of checkering illustrated in Fig. 10, a pattern controlling sleeve 40 is loosely mounted upon the rotation controlling sleeve 35. Said sleeve 40 comprises an aperture, developed in Fig. 4, the margins of which serve as limiting stops for the plunger 37. When the plunger engages any of said stops both translation and rotation of the arbor and associated parts are arrested. The configuration of the stop surfaces in Fig. 4 is such as to produce the pattern developed in Fig. 10. The outline of the pattern is obviously determined by the intersection of groove 36 with the margins of the aperture in pattern sleeve 40. The pattern sleeve is fixed to the arbor 23 in order to move at all times with the work on sleeve 24.

To index the rotation sleeve 35 relative to the pattern sleeve 40, the following mechanism is provided: An arm 43, fixed to a projecting end of the rotation sleeve, has pivoted thereto at 44 an escapement pawl carrier 45. The escapement pawls on said member 45 co-operate with peripheral and crown teeth 46 and 461 on a disk 47 secured to the pattern sleeve 40 by suitable means such as that illustrated in Figs. 1 and 3. A coiled flat spring 48 has one end connected with the rotation sleeve 35 and its opposite end secured to the disk 47, which disk, with the pattern sleeve 40, thus tends to rotate with respect to the rotation controlling sleeve 35. The movement of sleeve 40 with respect to sleeve 35 is controlled by pawls on the pawl carrier 45. One of these pawls 49 engages the peripheral teeth 46 of disk 47, while the second pawl 50 engages between the crown teeth 461, said teeth being cut for this purpose in the manner illustrated in Fig. 2. Pawl 50 may be integral with the carrier 45, while pawl 49 is preferably carried by a plunger 51 provided with a finger piece 52 and urged inwardly by a spring 53, whereby disk 47 can be freed from both pawls by retracting said plunger. Spring 53 likewise serves to normally retain pawl carrier 45 in position to engage pawl 49. Indexing is normally effected by rocking the pawl carrier 45 about its pivot 44 to engage the pawl 50 and disengage pawl 49; the pawl carrier is then permitted to assume its normal position shown in Fig. 1, the disk 47 having in this movement escaped one tooth with respect to pawl 49.

The cutting wheel 32 is carried on a shaft or arbor 55 journaled in a yoke frame 56 and provided with suitable means for connection with a source of power such as the belt wheel 57 through which it may be driven from the motor 15. The yoke 56 is integral with or rigidly connected to a bar 58 sliding in a suitable guide-way in a guide block 59

secured to the arm 12. Said yoke, with the cutting wheel, is urged downwardly by a suitable means such as spring 60 engaging with the end of the bar 58 and a suitable abutment in guide block 59. Connected to the bar 58 is a lifting link 61 having a pivotal connection with a lever 62 pivoted in a bracket 621 and adapted for manual operation by any suitable means such as a link connection to a treadle by the depression of which the cutting wheel is lowered upon the work. The depth of the cut made by the wheel is limited and regulated by a pressure foot 63 which straddles the wheel and is provided with a shank by which it is adjustably secured to the bar 58.

Means are provided for interrupting the cutting action of the wheel 32, while the compound movement of the work continues, for the purpose of producing such uncut surfaces within the pattern as illustrated in Fig. 10. It is obvious that if the cutting wheel is merely lifted out of contact with the work during a certain movement of the work, an uncut pattern of any desired configuration may be produced. For this purpose, a gear wheel 64 is fixed to the pattern sleeve 40 and meshes with a gear wheel 65 secured to a shaft 66 supported from the base 18 in suitable brackets. Said shaft carries an elongated cam 67, the effective portion of which has a configuration corresponding to the pattern desired. Said cam 67 controls a cam follower 68 suitably supported from the frame post 11. The upper end of said cam follower is provided with a stud 69 which underlies a short arm 70 extending from the cutting wheel supporting frame or yoke 56. Obviously, when the high part of cam 67 engages cam follower 68 the cutting wheel will be lifted out of engagement with the work and will remain out of engagement until, in the rotation of pattern sleeve 40 and the accompanying rotation and the advance of the work, the cam follower passes off from the high part of the cam. The length of the uncut figure in the pattern is determined by the length of cam 67, it being remembered that said cam advances with the work while the cam follower is on the stationary frame.

The operation of the machine is as follows: A piece of work, such as a fore-end, is placed upon the sleeve 24 in the proper position with respect to the pattern determining opening in sleeve 40. The rotation sleeve 35 is thereupon rotated into such a position with respect to the pattern sleeve 40 that the cutting wheel 32 will be properly positioned to begin the first of the diagonally extending cuts or grooves which form the pattern, as for example the groove indicated by the numeral 72 on Fig. 10. For the making of this cut and those parallel therewith, the bed plate 16 and parts carried thereby are moved to the right hand side of the base 10. Only a short

section of the cam groove 36 corresponding to the length of the cut 72 is exposed through the pattern opening. The plunger 37 being pushed in the groove 36, the lever 33 is drawn backward until said plunger engages the side wall of the pattern opening. The cutting wheel 32 being rotated through its connection with the driving motor, said wheel is lowered into cutting relation with the work, and the work is simultaneously advanced and rotated by pushing lever 33 forward until the motion of the lever and the connected parts is stopped by the engagement of plunger 37 with the diagonally extending end wall of the pattern opening. The cutting wheel 32 is thereupon lifted out of contact with the work, the work is indexed one step to the left by manipulation of the pawl carrier 45, and the lever 33 is again drawn backward until stopped by the engagement of plunger 37 with the side wall of the pattern opening. The cutting wheel 32 is now again lowered and the lever 33 pushed forward in order to make a second diagonal cut parallel with the first. This operation is repeated until all of the cuts parallel with the cut 72 have been made. When the cutting tool reaches the margin of the uncut figure 73 within the pattern, said wheel is automatically lifted out of cutting engagement with the work by the action of cam 67 upon its cam follower 68, and remains out of engagement for each of the successive interrupted cuts until the rotation of the pattern sleeve carries the high part of the cam from beneath the cam follower. The number of cuts which are thus interrupted, as well as the length of the break in each cut, is determined by the configuration of cam 67. When all of the cuts which are parallel to the cut 72 have been made, the work supporting and controlling mechanism is swung to the left to position the work for receiving the second set of diagonal cuts, and rotation sleeve 35 is rotated to engage plunger 37 in opposite spiral groove, and the operation above described is repeated. Since the cutting tool is a circular wheel, the several grooves will not terminate sharply; hence, it is desirable to finish the pattern by extra marginal cuts which lie outside of the pattern as determined by the pattern sleeve. It is for this purpose that the loose connection between the arbor 23 and the work supporting sleeve 24 is provided.

The rotation sleeve may be indexed any desired number of spaces relative to the pattern sleeve for making such finishing marginal cuts as illustrated in Fig. 10.

The embodiment of the invention herein described and shown in the drawings is to be understood as illustrative only, the invention being susceptible to embodiment in many other forms, all falling within the scope of the appended claims, which claims are to be broadly construed.

What is claimed is:

1. In a machine of the character described, a fixed cutting tool support, a cutting tool carried by said support, a work supporting arbor adapted to hold a piece of work in co-operative relation to said cutting tool, work rotating and traversing means comprising a rotation controlling sleeve associated with said arbor, and work rotation and traverse limiting means comprising a pattern controlling sleeve associated with said rotation controlling sleeve.
2. In a machine of the character described, a fixed cutting tool support, a cutting tool carried by said support, a work supporting arbor adapted to hold a piece of work in co-operative relation to said cutting tool, work rotating and traversing means comprising a rotation controlling sleeve associated with said arbor, work rotation and traverse limiting means comprising a pattern controlling sleeve associated with said rotation controlling sleeve, and means for indexing said rotation controlling sleeve relative to said pattern controlling sleeve.
3. In a machine of the character described, a fixed cutting tool support, a cutting tool carried by said support, a work supporting arbor adapted to hold a piece of work in cooperative relation to said cutting tool, work rotating and traversing means comprising a rotation controlling sleeve associated with said arbor, work rotation and traverse limiting means comprising a pattern controlling sleeve associated with said rotation controlling sleeve, and means for indexing said work relative to said rotation controlling sleeve.
4. In a machine of the character described, a fixed cutting tool support, a cutting tool carried by said support, a work supporting arbor adapted to hold a piece of work in co-operative relation to said cutting tool, work rotating and traversing means comprising a rotation controlling sleeve associated with said arbor, work rotation and traverse limiting means comprising a pattern controlling sleeve associated with said rotation controlling sleeve, means for indexing said rotation controlling sleeve relative to said pattern controlling sleeve, and means for indexing said work relative to said rotation controlling sleeve.
5. In a machine of the character described, a fixed cutting tool support, a cutting tool carried by said support, a work supporting arbor adapted to hold a piece of work in co-operative relation to said cutting tool, work rotating and traversing means comprising a rotation controlling sleeve associated with said arbor, work rotation and traverse limiting means comprising a pattern controlling sleeve associated with said rotation controlling sleeve, means for indexing said rotation controlling sleeve relative to said pattern controlling sleeve comprising a spring con-

nection between said sleeves, a toothed disk associated with one of said sleeves, and an escapement pawl associated with the other sleeve and adapted for cooperation with said disk.

6. In a machine of the character described, a fixed cutting tool support, a cutting tool carried by said support, a work supporting arbor adapted to hold a piece of work in co-operative relation to said cutting tool, means for moving said work with respect to said tool to cause the cutting of a pattern on said work comprising a work rotation and traverse controlling member associated with said work supporting arbor, and means for limiting and defining the pattern cut by said tool on said work by stopping the relative movement of said work and said tool, said means comprising a pattern controlling member associated with said rotation and traverse controlling member and normally moving therewith.

7. In a machine of the character described, a fixed cutting tool support, a cutting tool carried by said support, a work supporting arbor adapted to hold a piece of work in co-operative relation with and oblique to the plane of said cutting tool, means for moving said work with respect to said tool to cause the cutting of a pattern of two series of diagonally extending and relatively angularly disposed grooves on said work comprising a rotation controlling sleeve provided with two spiral guide surfaces of opposite pitch, the pitch of each of said guide surfaces being determined with reference to the inclination of said diagonally extending grooves, and means for reversing the angle of said work to said cutting tool to correspond to the one of said spiral guide surfaces which is effective.

8. In a machine of the character described, a fixed cutting tool support, a cutting tool carried by said support, a work supporting arbor adapted to hold a piece of work in cooperative relation to said cutting tool, means for moving said work with respect to said tool to cause the cutting of a pattern on said work comprising a work rotation controlling sleeve, a pattern controlling sleeve surrounding said work rotation controlling sleeve, a guide groove in said rotation controlling sleeve, a fixed member engaging in said guide groove and adapted to limit the movement of the work relative to the cutting tool by engagement with said pattern controlling sleeve.

9. In a machine of the character described, a fixed cutting tool support, a cutting tool carried by said support, a work supporting arbor adapted to hold a piece of work in cooperative relation to said cutting tool, means for moving said work with respect to said tool to cause the cutting of a pattern on said work comprising a work rotation controlling sleeve, a pattern controlling sleeve surround-

ing said work rotation controlling sleeve, a guide groove in said rotation controlling sleeve, a fixed member engaging in said guide groove and adapted to limit the movement of the work relative to the cutting tool by engagement with said pattern controlling sleeve, means for interrupting the pattern comprising a device adapted to lift the tool out of engagement with the work, and operating mechanism for said device associated with said pattern controlling sleeve.

10. In a machine of the character described, a cutting tool, a work supporting arbor adapted to hold a piece of work in cooperative relation to said cutting tool, means for causing said tool to cut a pattern on said work comprising a work rotation and traverse controlling sleeve provided with a guide groove, a pattern controlling sleeve surrounding said rotation controlling sleeve and provided with an aperture of a configuration corresponding with the configuration of the desired pattern, a fixed controlling member extending through the aperture in said pattern controlling sleeve and entering the groove in said rotation controlling sleeve and adapted to limit both the rotation and the traverse of the work by engagement of the margins of the aperture in said pattern controlling sleeve.

11. In a machine of the character described, a cutting tool, a work supporting arbor adapted to hold a piece of work in cooperative relation to said cutting tool, means for causing said tool to cut a pattern on said work comprising a rotation and traverse controlling sleeve associated with said arbor and comprising a guide groove, a pattern controlling sleeve surrounding said rotation controlling sleeve and comprising an aperture of a configuration corresponding to the desired pattern, movement limiting means comprising an element extending through the aperture in the pattern controlling sleeve and entering the guide groove in the rotation controlling sleeve, means normally effective to couple the rotation controlling sleeve and the pattern controlling sleeve together, and means for indexing said rotation controlling sleeve relative to said pattern controlling sleeve.

12. In a machine of the character described, a fixed cutting tool support, a cutting tool carried by said support, a work supporting arbor adapted to hold a piece of work in cooperative relation to said cutting tool, means for moving said work with respect to said tool to cause the cutting of a pattern on said work comprising a work rotation controlling sleeve, a pattern controlling sleeve surrounding said work rotation controlling sleeve, means for interrupting the pattern comprising a tool lifting cam, and means for moving said cam in synchronism with said pattern controlling sleeve.

13. In a machine of the character described, a fixed cutting tool support, a cut-

ting tool carried by said support, a work supporting arbor adapted to hold a piece of work in cooperative relation to said cutting tool, means for moving said work with respect to said tool to cause the cutting of a pattern on said work comprising a work rotation controlling sleeve, a pattern controlling sleeve surrounding said work rotation controlling sleeve, means for interrupting the pattern comprising a tool lifting cam, and means for moving said cam in synchronism with said rotation and pattern controlling sleeves.

14. In a machine of the character described, a fixed cutting tool support, a cutting tool carried by said support, a work supporting arbor adapted to hold a piece of work in cooperative relation to said cutting tool, means for moving said work with respect to said tool to cause the cutting of a pattern of two series of diagonally extending and relatively angularly disposed grooves on said work comprising a rotation controlling sleeve provided with two spiral guide surfaces of opposite pitch, the pitch of each of said guide surfaces being determined with reference to the inclination of said diagonally extending grooves, and a member carried on a stationary part of the machine frame adapted to engage one of said spiral guide surfaces and movable to permit shifting of said rotation controlling sleeve to bring either of said surfaces into engagement therewith.

15. In a machine of the character described, a cutting tool, a work supporting arbor adapted to hold a piece of work in cooperative relation to said cutting tool, means for causing said tool to cut a pattern on said work comprising a work rotation and traverse controlling sleeve provided with a guide groove, a pattern controlling sleeve surrounding said rotation controlling sleeve and provided with an aperture of a configuration corresponding with the configuration of the desired pattern.

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