J. T. SCOTT.

SCARFING MACHINE.

APPLICATION FILED OCT. 5, 1918.

1,330,498.

Patented Feb. 10, 1920.

3 SHEETS—SHEET 1.

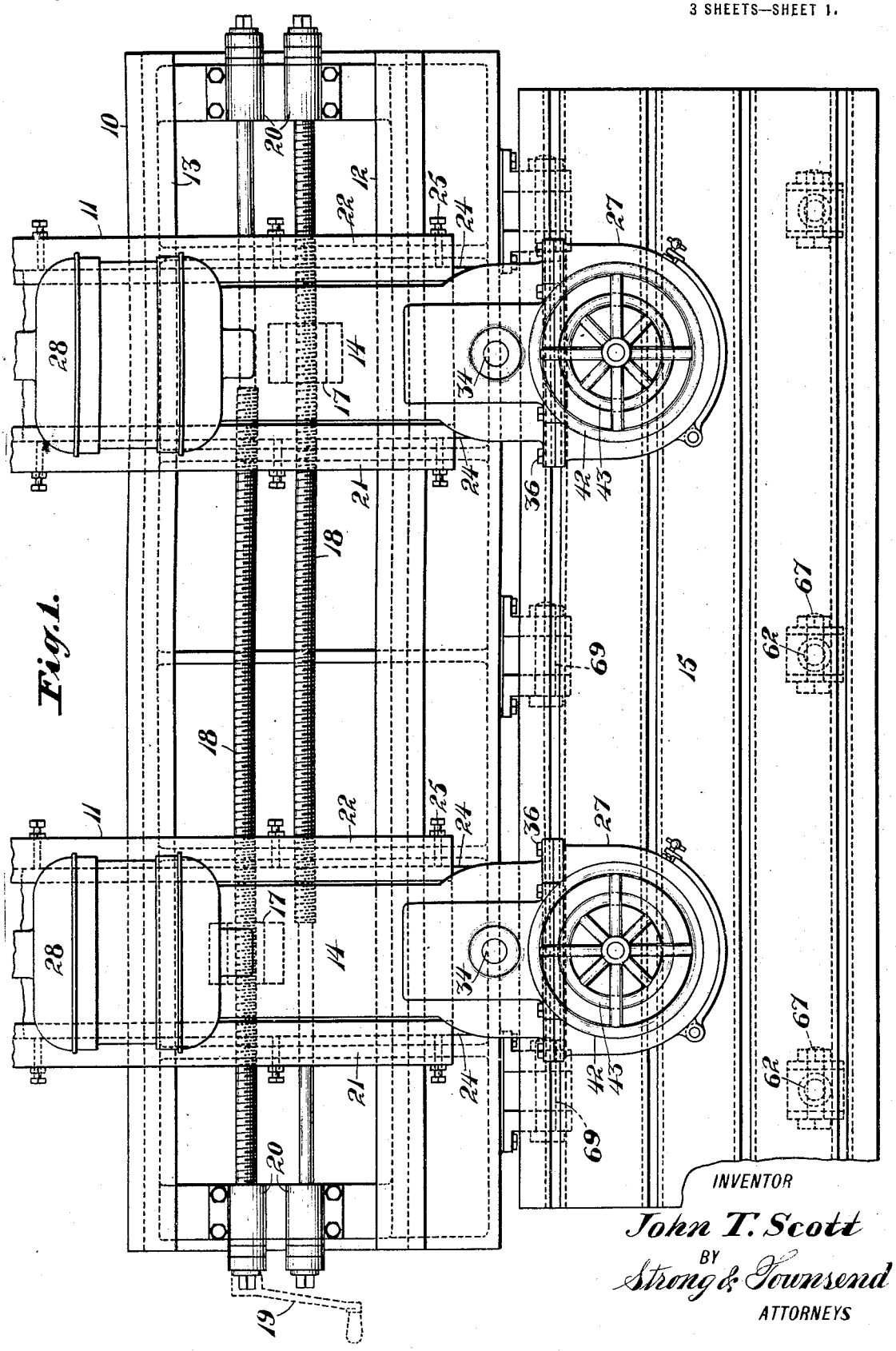

Fig. 1.

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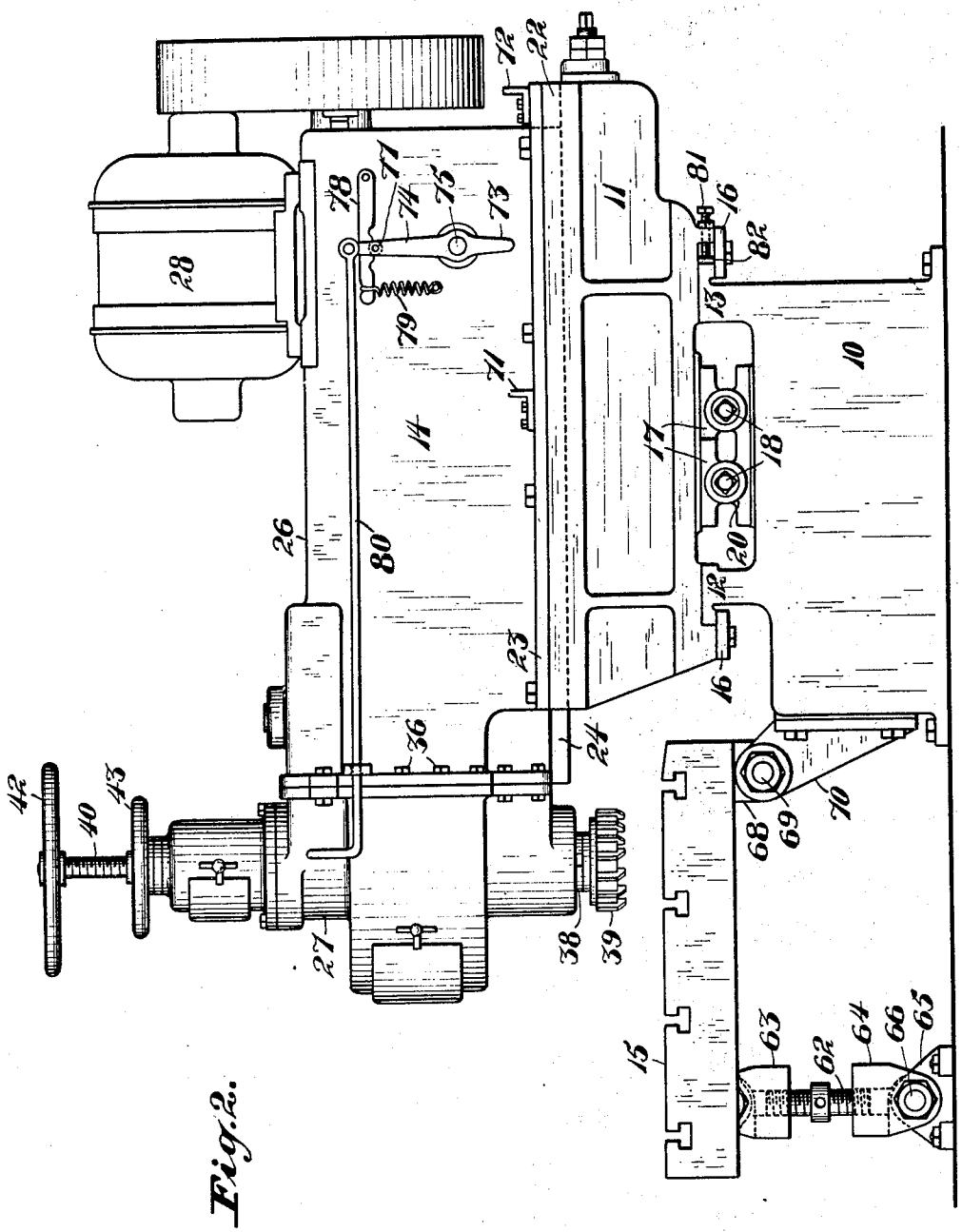

Fig. 2.

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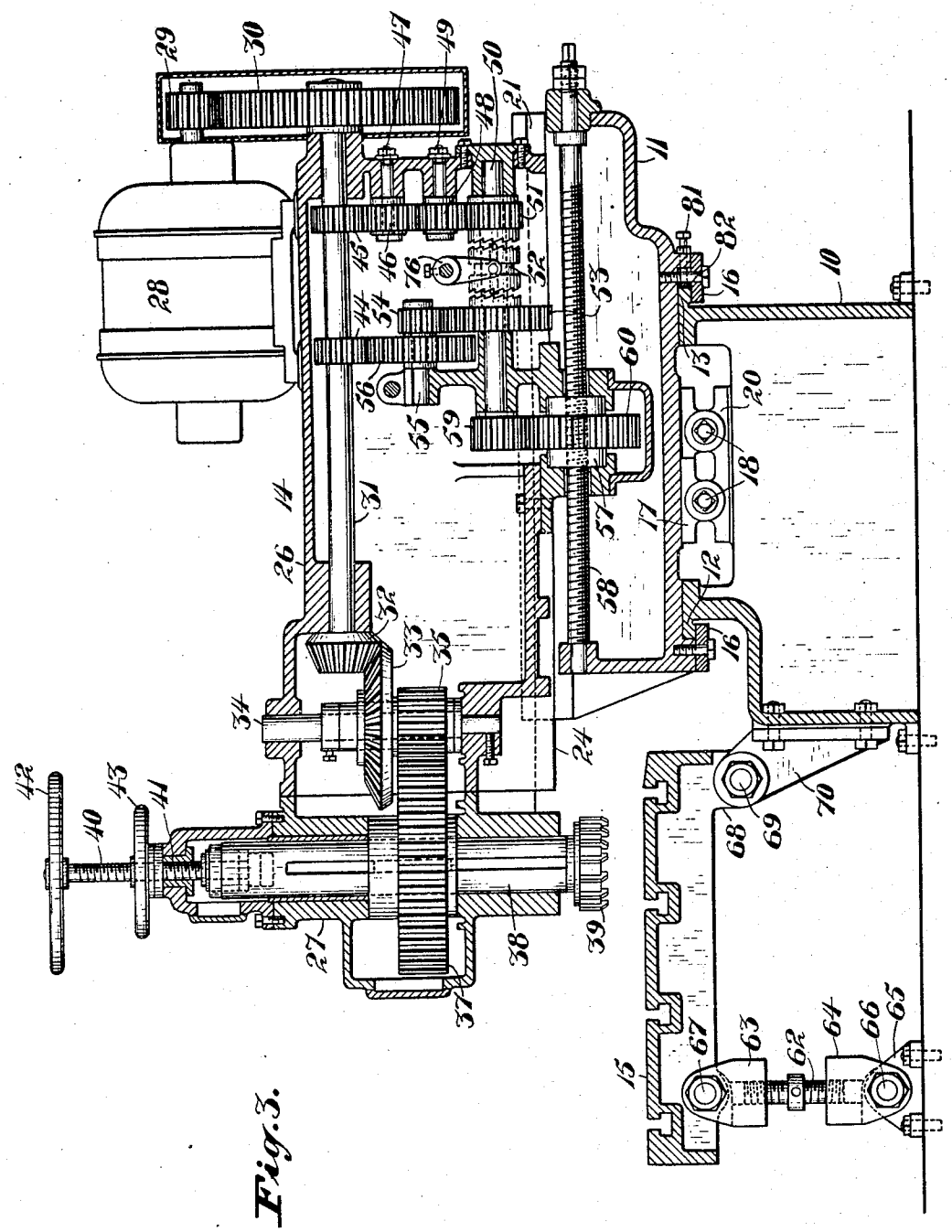

Fig. 3.

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UNITED STATES PATENT OFFICE.

JOHN T. SCOTT, OF OAKLAND, CALIFORNIA.

SCARFING-MACHINE.

1,330,498. Specification of Letters Patent. Patented Feb. 10, 1920.

Application filed October 5, 1918. Serial No. 256,956.

To all whom it may concern:

Be it known that I, JOHN T. SCOTT, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented new and useful Improvements in Scarfing-Machines, of which the following is a specification.

This invention relates to a machine tool and particularly pertains to a scarfing machine.

In shipbuilding construction it has been found necessary to overlap certain portions of the plates used in forming the shell of the ship and in order to reduce the work incident to making the joint, a scarfing machine has been provided which will eliminate the use of blocks in filling out the irregularities in the contour of the ship surface after the joint between the plates has been made. In order that the work may be done rapidly and in a workmanlike manner, it is essential that the scarfed portions of the several plates register properly and it is therefore an object of the present invention to provide a scarfing machine adapted to receive a plate and to perform scarfing operations thereon at predetermined points upon the surface and simultaneously.

Another object of this invention is to provide a scarfing machine having a rigidly supported table adapted to form a solid base for the plates and which may be adjusted to dispose the plain surface of the plate at any desired angle to the cutting plane of the scarfing machine.

A further object of this invention is to provide a machine having a plurality of scarfing units which may be adjustably set in relation to each other and in relation to a plate to be cut, thereafter being fixed to automatically traverse the desired surface with the surety that the two scarfed portions will be in proper relation to each other and of corresponding diameters and shapes.

Other objects of the invention appear hereinafter.

The invention is illustrated by way of the accompanying drawings in which—

Figure 1 is a view in plan illustrating the completely assembled scarfing machine as fitted with two scarfing units and particularly showing the adjustable means provided for moving the units in relation to each other.

Fig. 2 is a view in end elevation disclosing the machine and further illustrating the adjustable table.

Fig. 3 is a view in longitudinal section taken centrally of one of the scarfing units and clearly showing the operating mechanism incorporated therein.

In the drawings, 10 indicates a rigid base which is mounted upon a permanent foundation and supports a superstructure 11. The base is formed with ways 12 and 13 which extend parallel to each other and are of sufficient length to accommodate two or more scarfing units 14 and to permit them to have considerable latitude in movement relative to each other and a table 15. The superstructure 11 is in reality a carriage fitted with plane surfaces which rest upon the ways 12 and 13. This member is further held in sliding relation to these ways by means of guide plates 16 bolted to the under-face of the carriage and adapted to extend beneath overhanging flanges upon the ways. Projecting downwardly from the carriage is a hanger 17 threaded to receive a feed screw 18. In the present instance there are two of these screws extending parallel to each other, due to the dual construction of the machine and these screws may be optionally rotated by means of a crank arm 19. This arm may be permanently connected to the squared ends of the screws or removable therefrom, as desired. The opposite ends of the screws are rotatably supported in bearings 20 carried by the base and which hold the screws against longitudinal movement, suitable thrust washers being interposed between the screw ends and the bearings to relieve the friction incident to the thrust of the screws when in operation. The carriage 11 is provided with a pair of transverse ways 21 and 22. These ways extend at right angles to the path of travel of the carriage and are adapted to permit the scarfing machine unit 14 to reciprocate laterally of the machine when desired. The ways 21 and 22 are fitted with retainer plates 23 which overlap flanges 24 formed on the body of the scarfing units and by which the units are held in sliding relation to the ways. Suitable gib plates may be interposed between the flanges 24 and sides of the ways and may thereafter be locked in a set position by the set screws 25 to take up any side motion existing between the carriage and the scarfing unit. As

shown in Fig. 3, each scarfing unit consists of a case 26 within which a driving mechanism is carried and upon which a cutting head 27 is mounted.

The driving mechanism comprises a motor 28 carried upon the top of the case and upon the rotating shaft of which a driving pinion 29 is fixed. This pinion meshes with a large gear 30 fixed upon the rear end of a main drive shaft 31. The drive shaft is rotatably mounted within bearings inside of the case and extends forwardly therethrough. A bevel gear 32 is fixed to the forward end of this shaft and is in mesh with a large bevel gear 33. This last named gear is carried upon a vertical stub shaft 34 inclosed within the casing and which also is fitted with a gear pinion 35. The portion of the casing surrounding the shaft 34 and its gears is open at the end and is adapted to unite with the casing head 27. This head is bolted to the main casing by bolts 36 extending through flanges upon the casing and the head. These flanges, of course, extend vertically. In mesh with the pinion 35 is a spindle gear 37 which is positioned between vertically aligned bearings in the head. This gear is splined to a cutter spindle 38, mounted for vertical motion within the head and carrying a milling cutter 39 at its lower end. The milling cutter may be of any preferred design and is here shown as being fitted with detachable teeth formed of special steel and designed for end milling. The spindle 38 may be vertically reciprocated by means of a screw 40 rotatably connected to the upper end of the spindle and extending through a threaded sleeve 41 held in the top of the cutter head. The end of this screw is fitted with a hand wheel 42 by which it may be rotated. A second hand wheel 43 is mounted upon the screw and is adapted to jam against the top of the casing or a thrust washer thereon to lock the screw against movement. It will be understood that the spindle and the gear 37 are splined to each other and thus the rotation of the spindle may be effected while the cutter 39 is being vertically adjusted.

The drive shaft 31 is provided with two spur pinions 44 and 45. The pinion 45 is nearer the rear end of the shaft and meshes with a gear 46 carried upon a stub shaft 47 and which in turn meshes with a complementary gear 48 carried upon a similar stub shaft 49. These three gears form a part of a train of gears which transmit power from the drive shaft to a jack shaft 50. This shaft carries a gear 51 in constant mesh with the gear 48 of the train and free to rotate on the shaft. The hub of the gear 51 is formed with a toothed end face with which complementary teeth of a reciprocating clutch member 52 may be engaged when desired. This clutch member is shown in Fig. 3 as splined upon the shaft 50 and as having clutch faces upon its opposite ends. The other clutch face of the member 52 may be brought to engage a complementary face upon the hub of a large spur gear 53 which is free to rotate upon shaft 50.

The gear 53 is in mesh with the pinion 54 carried upon the end of a reduction gear shaft 55. This shaft in turn carries a large gear 56 in engagement with the pinion 44 fixed upon the drive shaft 31. It will thus be observed that two trains of gears may be alternately used to drive the shaft 50 as this shaft is brought into connection with them by manipulation of the clutch member 52. The train of gears, of which the gear 45 is a part, act to drive the shaft in a reverse direction from the train of gears of which the gear 44 is a part. Due to the gear reduction effected in the last named train, it will be evident that when driven by these gears the shaft will move at a considerably lower rate of speed than otherwise. These two sets of gears are provided to rotate a threaded sleeve 57 carried upon a cross-feed screw 58. This rotation is reduced by a gear 59 fixed to the end of the shaft 50 and a gear 60 fixed upon the threaded sleeve 57. The gear 60 is mounted within a hanger extending downwardly from the ways 21 and projecting into a recess extending the length of the carriage 11. The screw 58 extends through this hanger and is rotatably held by its opposite ends in the carriage and at right angles to the feed screws 18 previously mentioned. One end of the cross-feed screw 58 is fitted with a squared portion to which a crank may be applied if it is desired to rotate this screw manually.

Disposed beneath the cutters 39 is a table 15 which is formed with a plurality of parallel longitudinally extending T slots by which work may be clamped thereto. The edge of the table nearest the mechanism is beveled and therefore provides clearance for the cutting tools when the table is inclined. The inclination of the table may be produced by turnbuckle mechanisms consisting of double threaded screws 62 which extend into shackle members 63 and 64. The lower members 64 are pivoted to standards 65 beneath the table by means of bolts 66. The upper shackles 63 are pivoted directly to the table by bolts 67. The opposite side of the table is formed with lugs 68, through which hinge bolts 69 extend. These last-named bolts also engage brackets 70 bolted to the front of the base 10. Due to this hinged connection between the table and the base and the adjustment provided, the table may be readily inclined to assume a desired angle in relation to the horizontal and thus in relation to the cutting plane of the milling members 39.

The length of the cutting plane may be automatically determined by stops 71 and 72 which are mounted upon plates 23 of the carriage and which may be alternately engaged by a finger 73, forming a part of a shifting lever 74. This lever is carried by an operating shaft 75 extending through the casing and into the inner end of which is fixed a shifting yoke 76. This yoke engages the clutch member 52 and causes it to slide along the shaft 50. The lever 74 is formed with a roller 77, adapted to register with a plurality of recesses upon a lock finger 78. The lock finger is yieldably held against the roller by means of a spring 79 and will thus temporarily hold the lever 74 in a desired position when the roller 77 is in one of the recesses of the member 78. A shifting rod 80 extends forwardly and is pivotally connected to the upper end of the lever 74. This rod may be manually operated to shift the clutch 52. Otherwise the clutch will be shifted by engagement of the finger 73 with either of the stops 71 or 72.

In operation, the table 15 is set at a desired angle to the horizontal by manipulation of the screws 62. Pieces of work are bolted upon the table before or after the setting operation. The scarfing units 14 are then adjusted along the bed plate 10 by means of the screws 18 to dispose the cutters 39 in proper relation to the plate to be scarfed. When this has been accomplished the carriages 11 may be locked against motion by set screws 81 which act against gib plates 82 and will lock the carriage against movement along the base. The motor 28 may then be set in motion and will drive the shaft 31 by means of the gears 29 and 30. This will immediately cause the spindle 38 and the cutter 39 of the units to be rotated. Adjustment of the cutter may then be effected by operation of the hand wheel 42 and the screw 40, after which the screw may be locked by the lock wheel 43. The cutter may then be fed across the table by shifting the clutch member 52 into engagement with the gear 53. This will cause the shaft 50 to be driven at a low rate of speed through the gears 44, 56, 54 and 53. Power will be thus delivered to the sleeve 57 and as the screw 58 is held against longitudinal movement, will thus force the cutter forwardly at the same time it is being driven. When the clutch 52 is in mesh with the gear 53, the shifting lever 74 will be in its rearmost position and the finger 73 will extend forwardly. As the stop finger 71 has been properly set to limit the forward movement of the cutting mechanism, the finger 73 will strike the stop at a predetermined moment and will swing the lever 74 to its extreme forward position. This will throw the clutch member 52 out of engagement with the gear 53 and into engagement with the gear 51. Rotation of the threaded sleeve 57 will be immediately produced and as there is slight gear reduction through the train of gears 45, 46, 48 and 51, the cutting head will be drawn through a return stroke at a high rate of speed in comparison to its feed stroke. This will continue until the finger 73 strikes the stop 72 when the feed stroke will be again commenced.

It will thus be seen that by the use of a permanent rigid base and an adjustable table fixed in relation to said base and over which a plurality of cutters may travel in predetermined relation to each other, that the work of scarfing plates will be materially reduced, both when the cutting time and the accuracy of the product is considered.

While I have shown the preferred form of my invention, it will be understood that various changes in the combination, construction and arrangement of parts may be made by those skilled in the art, without departing from the spirit of the invention as claimed.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. A machine tool comprising a bed plate, a vertically adjustable work table pivoted to the side of the bed plate, a plurality of carriages slidably and adjustably mounted along the bed plate, cutting mechanisms supported by each carriage and means whereby the cutting mechanisms may be simultaneously operated and actuated to move in a horizontal plane across the table.

2. A machine tool comprising a bed plate, a work table and a plurality of cutting members adapted to be adjusted horizontally in relation to each other and to be fed simultaneously across the table and means for individually adjusting the cutting depth of each of the cutting members.

3. A machine tool comprising a bed plate, a table alongside of said plate, a plurality of cutting elements supported by the plate and adapted to be adjustably carried thereupon, means for automatically feeding the cutting elements across the plate and means for individually adjusting the cutting members to cause them to cut at predetermined depths.

4. A machine tool comprising a bed plate, a work table, means for disposing said work table at various angles to the horizontal and in hinged relation to the bed plate, a series of individual cutting units, each comprising power transmission means, a rotary cutter and cross-feeding means and means whereby said cutting units may be individually adjusted along the bed plate and in relation to the work table.

5. In a device of the character described,

a rotary cutting element, a vertical spindle carried by said element, a housing within which said spindle is rotatably mounted, means for driving said spindle, means for reciprocating the spindle during its driving operation and variable feed means for the housing, whereby the cutting stroke of the machine will take place at one rate of speed and the return stroke at a greater rate of speed.

6. In a device of the character described, a rotary cutting element, a vertical spindle carried by said element, a housing within which said spindle is rotatably mounted, means for driving said spindle, means for reciprocating the spindle during its driving operation, variable feed means for the housing, whereby the cutting stroke of the machine will take place at one rate of speed and the return stroke at a greater rate of speed and automatically tripping means for determining the length of stroke of the cutting elements and reversing their direction of travel at the ends of said stroke.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOHN T. SCOTT.

Witnesses:
W. W. HEALEY,
JOHN H. HERRING.