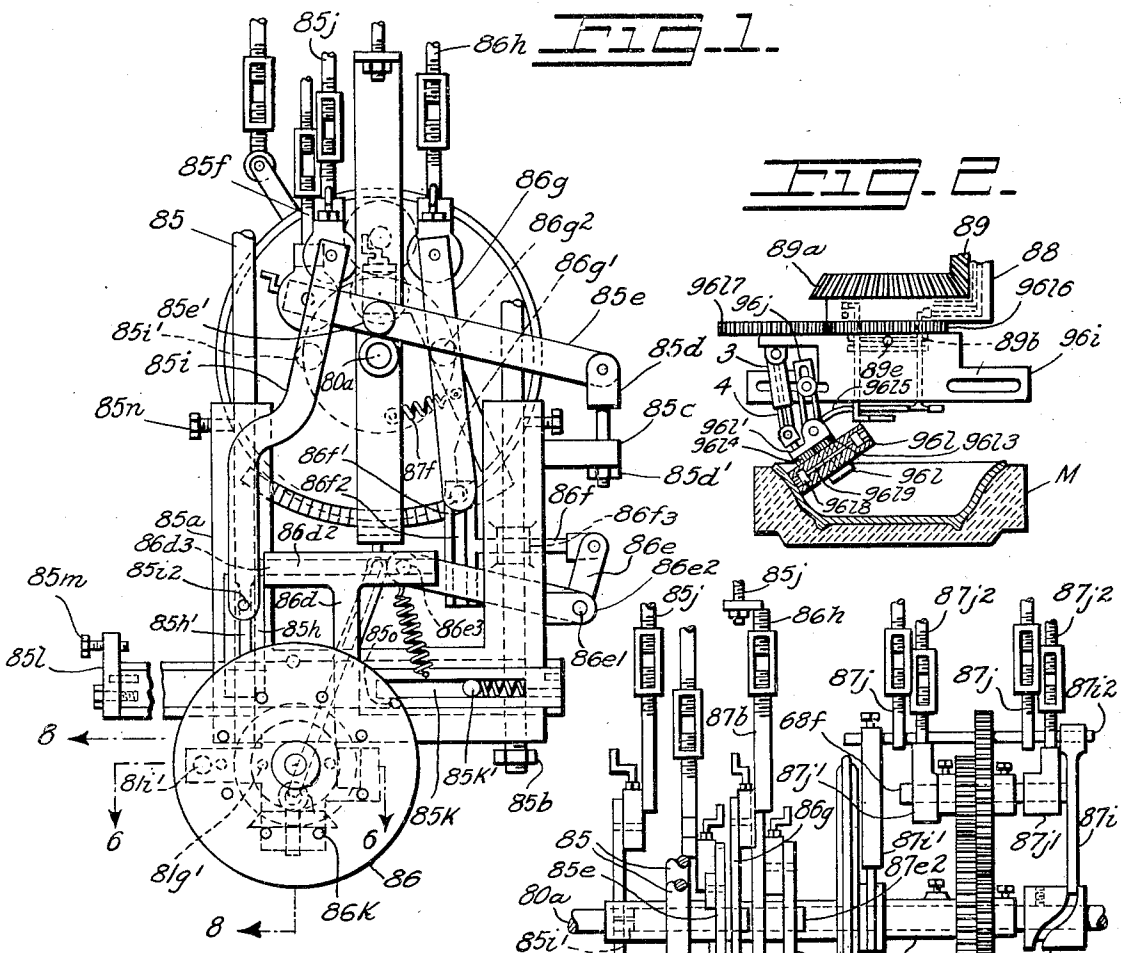
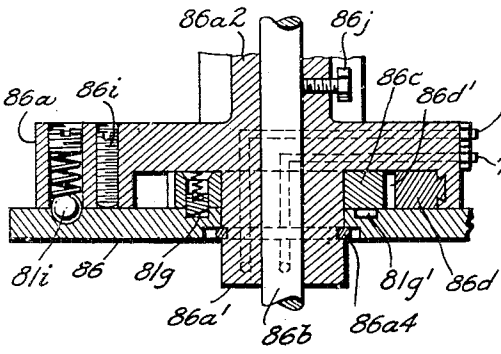
July 13, 1943. W. J. MILLER 2,324,410

APPARATUS FOR DECORATING POTTERY WARE

Original Filed March 29, 1935 4 Sheets-Sheet 1





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Fig. 3

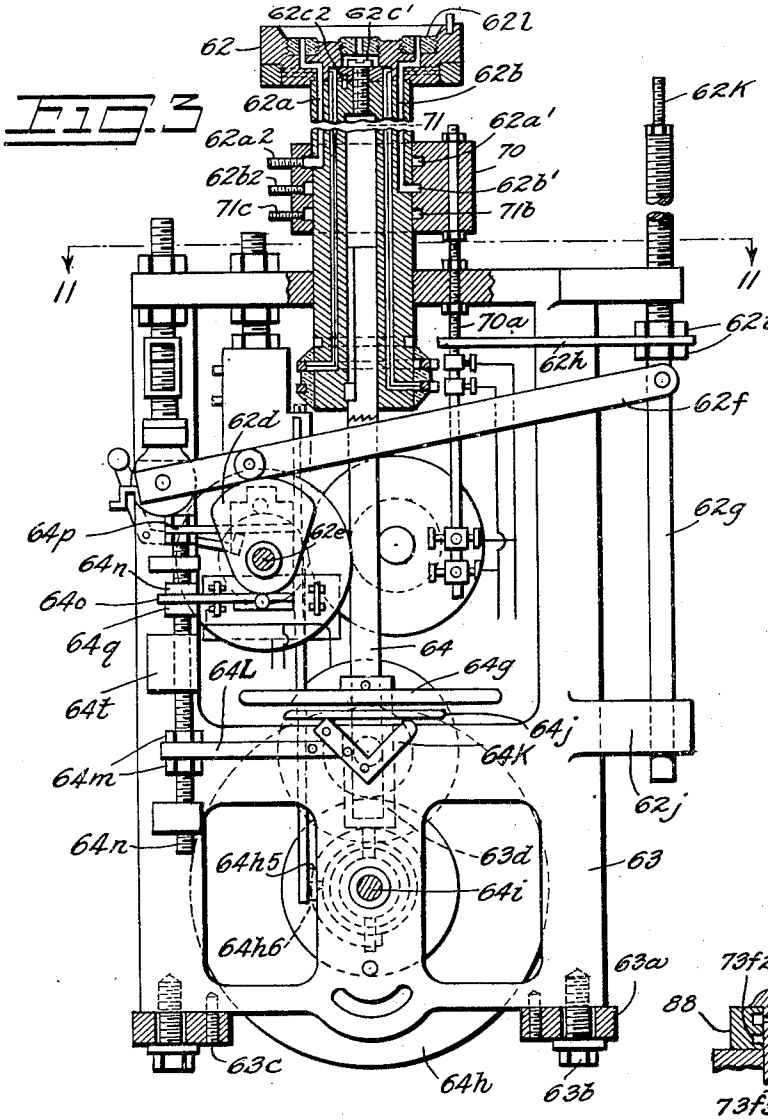


Fig. 7

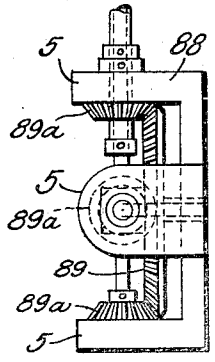


Fig. 8

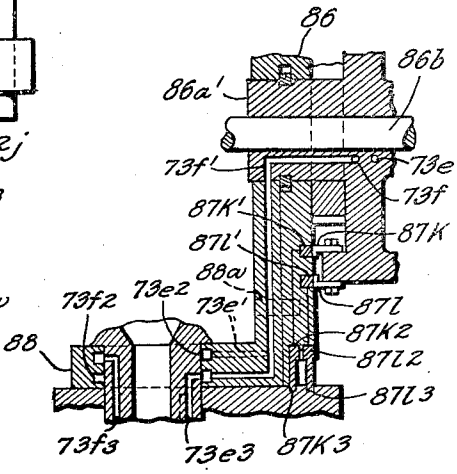
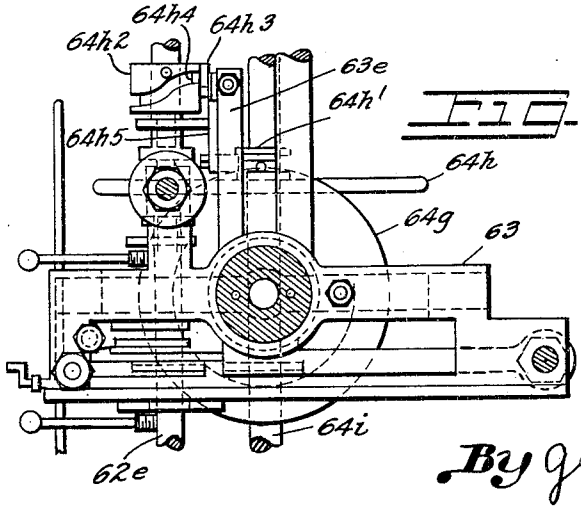


Fig. 11



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FIG. 9.

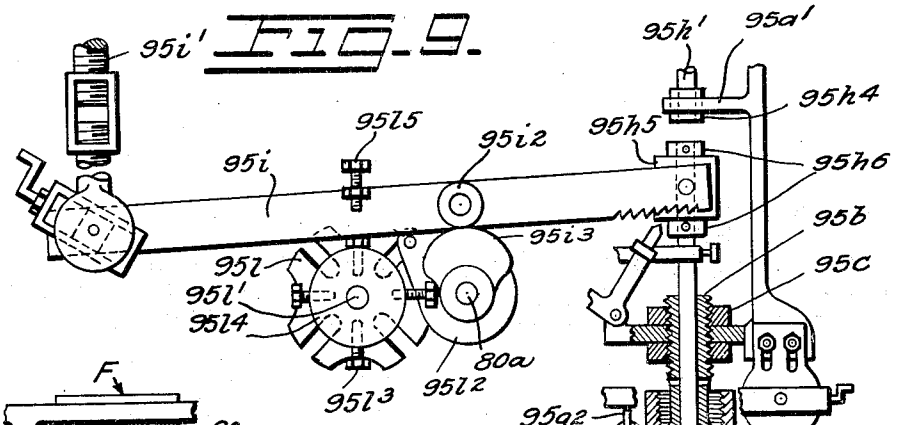
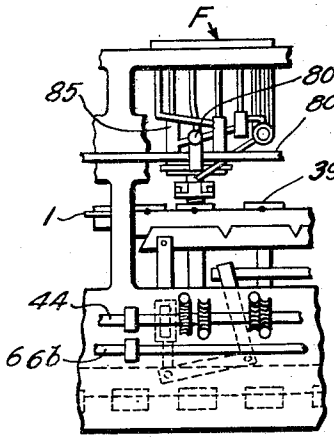


FIG. 10A.



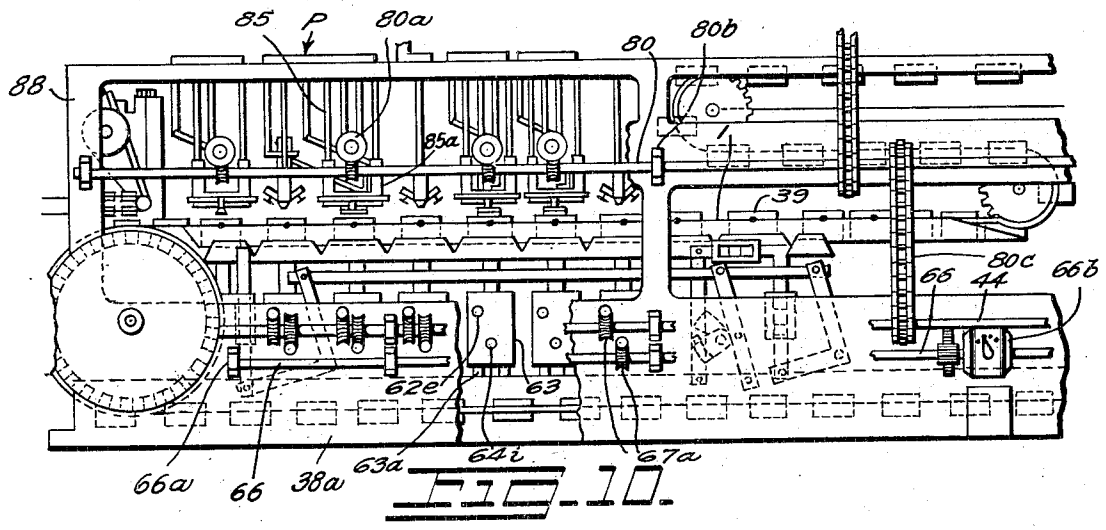


FIG. 10.

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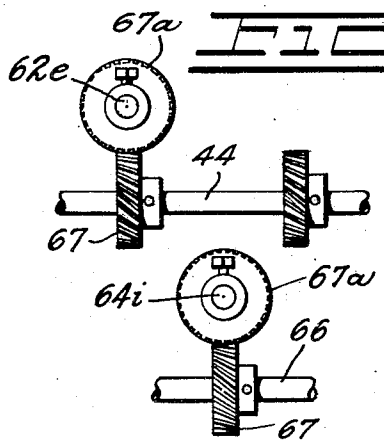


Fig. 12.

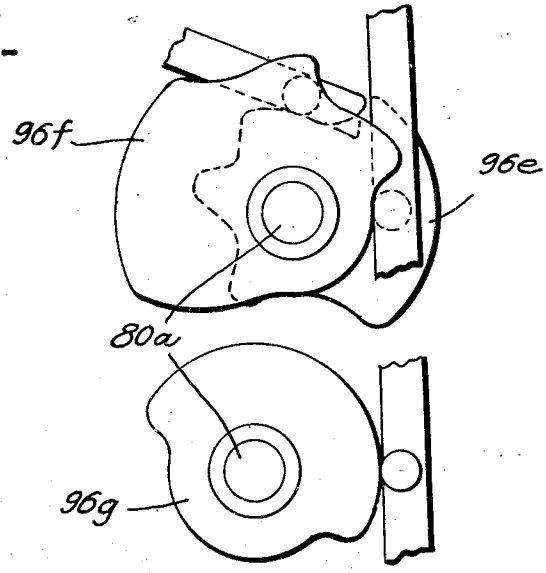


Fig. 13.

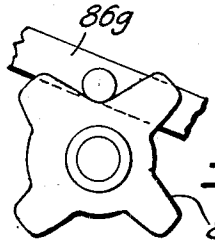


Fig. 14.

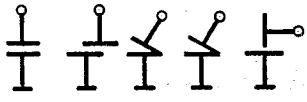


Fig. 15.

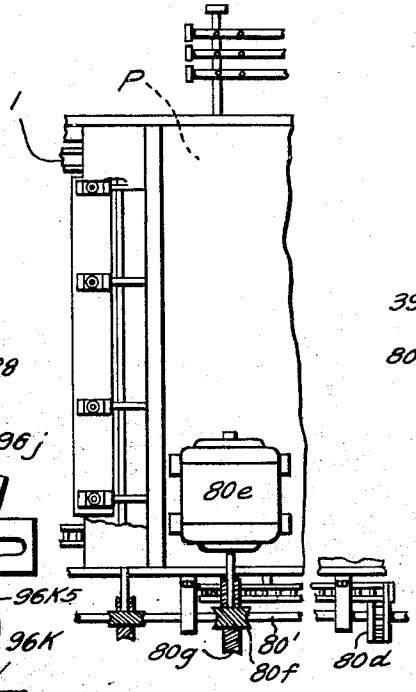


Fig. 19.

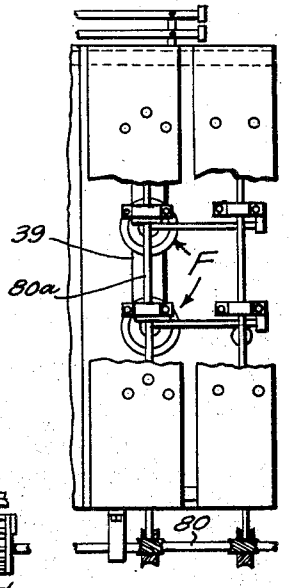


Fig. 18.

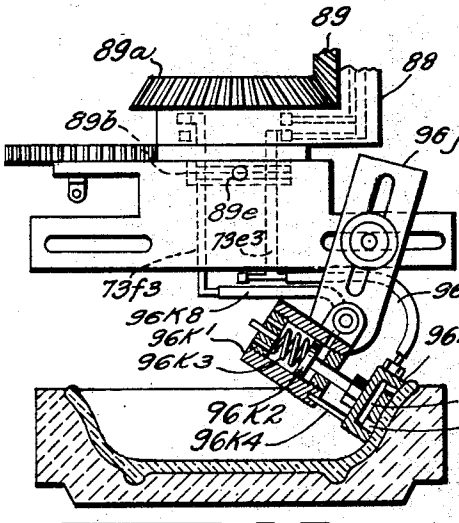


Fig. 16.

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UNITED STATES PATENT OFFICE

2,324,410

APPARATUS FOR DECORATING POTTERY WARE

William J. Miller, Swissvale, Pa.

Original application March 29, 1935, Serial No. 13,683. Divided and this application June 6, 1941, Serial No. 396,805

16 Claims. (Cl. 91—12)

This invention relates to an apparatus for decorating pottery ware. It has to do particularly with applying bands, lines, stripes and the like and other forms of decoration to pottery ware.

This application is a division of my co-pending application, Serial No. 13,683, filed March 29, 1935.

In the drawings:

Fig. 1 is a view in front elevation of a tool or attachment carriage assembly to which various fabricating tools and attachments are applied.

Fig. 2 is a view illustrating a banding wheel attachment for mounting on the carriage assembly of Fig. 1.

Fig. 3 is a view in section and side elevation of a mold-ware actuating assembly.

Fig. 4 is a view of Fig. 1 in side elevation.

Fig. 5 is a detail fragmentary view of a friction drive.

Fig. 6 is an enlarged sectional view taken on line 6—6 of Fig. 1.

Fig. 7 is a side elevation of an appliance for mounting the banding wheel attachment of Fig. 2 on the carriage assemby of Fig. 1.

Fig. 8 is a view taken on the line 8—8 of Fig. 1.

Fig. 9 is a detail partly in section of a pump for supplying decorating material to the banding wheel.

Fig. 10 is a view showing the ware conveyor and the decorating station for decorating ware after it emerges from the dryer.

Fig. 10A is a view showing the station for decorating ware before the ware moves into the dryer.

Fig. 11 is a horizontal section plan view taken on the line 11—11 of Fig. 3.

Fig. 12 is a reduced fragmentary detail of a drive unit.

Fig. 13 is a detail view of cams which may be used with the carriage assembly shown in Fig. 2.

Fig. 14 is a view in elevation of another cam.

Fig. 15 is a diagrammatic illustration to clarify the operation of the decorating assembly.

Fig. 16 is an elevation showing another form of decorating device.

Fig. 17 is a detail partly in section of a part of the mold actuating assembly.

Fig. 18 is a plan view across the production lines at the decorating station for ware before the ware enters the dryer.

Fig. 19 is a plan view across the production lines at the decorating station for ware, after the ware leaves the dryer.

The decorating apparatus at F, Fig. 10A, and P, Fig. 10, are arranged across the production lines as shown in Fig. 18.

The decorating attachments are mounted on a standard form of carriage assembly substantially similar to that illustrated in Figs. 1 and 4, for the purpose of giving them the desired movements relatively to the ware on which they are to perform.

The reference numeral 85 designates vertical guide and stop posts which are adjustably secured in and depend from one of the top plates 38c of the machine (see Fig. 10A), a frame 85a shown as of rectangular shape being mounted to have a vertical sliding fit on said posts, nuts 85b being threaded on the lower extremities of said posts to adjustably limit the lowermost point of travel of said frame. The frame 85a is formed with a bracket 85c, which is bored to receive a pivot bolt 85d, which is adjustably secured by nut 85d', a lever 85e being pivoted at one extremity in said bolt and at its opposite extremity adjustably and pivotally supported from a post 85f, which also depends from and is secured in the top plate 38c. This lever 85e is provided with a cam roller 85e' adapted for contact with various types of frame-actuating cams shaped in accordance with the work involved and which are mounted on one of the cross shafts 80a, or if the variable speed assembly is used, on the sleeve 68, these cams being shown in connection with the various attachments hereinafter described.

The lower portion of the frame 85a is formed with a dove-tail slot or groove in which a bar 85g is mounted to have a horizontal sliding fit, the bar at the left as viewed in Fig. 1 being formed with a vertical guide bracket 85h having a central slot or track 85h'. A lever 85i provided with a cam roller 85i' is pivotally and adjustably supported at its upper extremity from a post 85j, and at its lower extremity said lever is provided with a pin 85i2 adapted to have a working fit in said track 85h'. As in the case of lever 85e, the cams for the lever 85i are given the required contour in accordance with the work involved and are mounted on one of the cross shafts 80a or sleeve 68, each attachment generally requiring a particular contoured cam which is illustrated in connection with the attachment.

The bar 85g is slotted at 85k, a pin 85k' being secured in the frame 85a, a compression spring 85k2 being mounted to abut at opposite ends, respectively, against said pin and the bar 85g. The bar 85g is also provided with a screw bracket 85l in which a contact screw 85m is mounted, which serves to adjustably limit the movement

of bar 85g in one direction independently of its cam travel or reverse movement. The screw bracket 85l is adapted to be attached at either end of bar 85g and the spring 85k2 at either end of slot 85k, to conform to the positive direction of movement of the cam lever 85i.

It will be seen that when levers 85e and 85t are oscillated, the frame 85a reciprocates vertically and the bar 85g laterally, the bar deriving its vertical movement from said frame. The frame is provided with screws 85n and 85o adapted to be adjusted in contact with the posts 85 and frame 85a in the event the actuating cams are to be disconnected and the frame and bar set in rigid adjusted position.

An attachment and tool-mounting turret disk is supported from the slide bar 85g by means of a hanger bracket 86a, said bracket being formed with projecting hub portions 86a' and 86a2 (see Fig. 6), and is secured to the bar 85g by screws 86a3, (see Fig. 4), the disk 86 being rotatably mounted on the hub 86a' and prevented from lateral displacement by a ring 86a4. A shaft 86b extends through and has bearing in the projecting hubs of bracket 86a, this shaft functioning in a manner which will later become apparent. The disk may be rotated intermittently in one direction or oscillated, the detents 81g and 81i being housed, respectively, in a gear 86c and the bracket 86a and adapted to register in detent or latch notches 81g' and spotting notches 81i formed in one side of said disk 86, there being four of each of said notches in the present instance. The gear 86c is mounted to rotate free on the bracket hub 86a' and the teeth 86c' of said gear are in continual mesh with the teeth 86d' of a rack 86d, the latter being slidably dovetailed into a groove formed in the bracket 86a (see Fig. 6), and terminating in a T-head 86d2, (see Fig. 1), which is formed with a track 86d3. The rack 86d is actuated by a bellcrank lever 86e, which is fulcrumed at 86e' on a bracket extension 86e2 formed on the frame 86a, the one extremity of said lever 86e being provided with a pin 86e3 which has a sliding fit in the groove or track 86d3, while the opposite extremity of said lever has pivoted thereto a connecting rod 86f which extends through a guide bracket 86f3 and terminates in a T-head 86f' formed with a groove or track 86f2, said T-head cooperating with a lever 86g pivotally supported at its upper extremity from a post 86h, which is secured in one of the top frame plates 38c, and at its lower extremity said lever is provided with a pin 86g' having a sliding fit in the groove or track 86f2 of T-head 86f'. Lever 86g is provided with a cam roller 86g2 adapted to contact with a suitably shaped cam to be mounted on shaft 80a, these cams also being generally shown with the respective attachments hereinafter described. A retracting spring 86d4 is secured at opposite extremities, respectively, to the T-head 86d2 and the bar 85g.

A screw 86i is shown as threaded in the bracket 86a, (see Fig. 6), this screw being adjusted against the turret disk 86 when it is desired to maintain said disk stationary with said bracket. A screw 86j is also shown threaded in the hub 86a2 of bracket 86a, and this screw may be adjusted against the shaft 86b when it is desired to maintain the latter stationary with said bracket.

The disk 86 is provided with a plurality of holes 86k for attaching various fabricating tools and attachments.

The shaft 86b may be driven by either a positive or friction drive, both forms of drive being shown in Figs. 4 and 5 for the purpose of illustration.

A bevel gear 87, formed with a hub 87', is shown as adjustably secured on the shaft 86b, this gear meshing with a similar gear 87a secured on a stub shaft 87a' which has bearing in the projecting extremity of a bracket arm 86a5 formed as part of the bracket 86a. A bracket 87b is adjustably supported by a post 87b' from one of the top frame plates 38c and extends down and at its lower extremity is formed with a foot 87b2, a stub shaft 87c having bearing in said foot, this shaft forming part of a flexible coupling comprising a sleeve 87c' and longitudinally grooved shaft 87c2 in spline sliding engagement with said sleeve, the lower extremity of shaft 87c2 being coupled for universal movement with the stub shaft 87a' on which gear 87a is secured. The stub shaft 87c of the flexible coupling has adjustably secured thereon a pinion gear 87d, which may be replaced by a friction gear 87d' (see Fig. 5), when a non-positive, intermittent or continuous high-speed drive is desired. If pinion 87d is used, the drive is effected by means of a segmental gear 87e formed on a lever 87e', which is adjustably pivotally mounted on the bracket 87b and provided with a cam roller 87e2 adapted to contact with a cam to be mounted on shaft 80a or sleeve 68 and which may be given various contours in accordance with the rotation desired for shaft 86b. The lever 87e' may be retracted by a spring 87f.

If the friction or non-positive drive is desired, the friction gear 87d' may be substituted for pinion 87d and a co-operating friction gear 87g splined or mounted for longitudinal sliding movement on shaft 80a or sleeve 68, the latter gear being formed with a hub having an annular groove 87g' formed therein. A grooved cam 87h, adjustably mounted on shaft 80a, transmits longitudinal sliding movement to friction gear 87g by means of a pin 87i, slide rod 87i2 and pin 87i', the pins 87i and 87i' being adjustably secured on slide rod 87i2 which in turn is mounted to slide longitudinally in adjustable supporting brackets 87j which extend upwardly and are secured in one of the frame plates 38c.

If the rotation of shaft 86b is to be alternately reversed, the drum cam 87h may be used, this cam movement causing the friction gear 87g to move across the face of gear 87d', and when the gear 87g passes over the vertical axis of gear 87d', the rotation of said gear will be halted and then reversed, thus reversing the drive on said shaft 86b.

The jack shaft 68f of the change-speed assembly is shown as mounted and having bearing in hanger brackets 87j' which are also adjustably supported by posts 87j2 from one of the frame plates 38c.

The decorating attachments, Figs. 2 and 16, are shown mounted on a turret 88 (see Figs. 7 and 8), which is secured to the disk 86 by screws 88a. This turret may be rotated in accordance with the particular attachments in use. If there are four attachments on the turret and all are being used in succession, the lever 86g may be actuated by a cam substantially similar to cam 86g3 (see Fig. 14).

Super and sub-atmosphere, electricity and other fluid mediums may be communicated to the various fabricating attachments that may

be applied to the turret disk 86 (see Figs. 6 and 8).

For super and sub-atmosphere, liquids and analogous fluids, the bracket 86 is bored to provide passages or ducts 73e and 73f, which lead through the hub 86a' and register with passages 73e' and 73f' formed in the turret 88, these later passages terminating in annular grooves or chambers 73e2 and 73f2. The fragment of the turret 88 shown in Fig. 8 is provided with a rotating spindle or post which is formed with passages 73e3 and 73f3 which register at one extremity with said chambers and at their opposite extremities terminate at the point of application. Hose nipples 73e4 and 73f4 are secured in the bracket 86a (see Fig. 6), for connection of the air or fluid lines leading from pump line 95e2, Fig. 9.

To supply the various attachments that may be applied to the turret 88 or disk 86 with electric current, the bracket arm 86a5 may be formed with a projection on which are secured brushes 87k and 87l, Fig. 8, which are adapted to contact with suitably insulated commutator rings 87k' and 87l' secured in the adjacent side of the disk 86, said rings being connected with another set of commutator rings 87k2 and 87l2 secured on the periphery of said disk and which in turn transmit the current to the attachment through contacts or rings 87k3 and 87l3 secured in the attachment, a fragment of the latter being shown in Fig. 8.

The apparatus just described is located at decorating stations F and P above the line of travel of ware conveyor 1 and below the line of travel of the ware conveyor are chucks 62 for manipulating the molds and ware. Station F is for decorating freshly formed ware and station P for ware emerging from the dryer.

As the open bottom mold carrying trays 39 bearing the ware progress along the lower main fabricating line, Figs. 10 and 10A, they pass over reciprocable and rotatable chucks 62 forming part of the mold actuating units shown by Fig. 3, which lift the work off the conveyor into cooperative relation with the decorating apparatus at stations F and P. The complete assembly is mounted on a skeleton frame 63 which is adjustably secured on cross supports 63a, by screw bolts 63b, extending through enlarged openings, and centering dowels 63c, the latter being removed in the event it is desired to shift the unit from its initially aligned position. The cross supports 63a are suitably adjustably secured to the base of the main frame 38 of the machine. The casting or frame 63 is provided with a bearing housing 63d for a spindle 64 (see Fig. 17), the lower extremity of which has secured thereon a collar 64a by means of a pin 64b, said collar supporting a thrust bearing assembly comprising a tapered collar 64c, bearing rollers 64c', a saddle 64d and spring 64e, a cover 64f being adjustably threaded into the housing against which said spring abuts, so that the spindle moves upwardly against the tension of said spring and lowers by gravity assisted by said spring.

The spindle 64 is in spline sliding engagement with a chuck spindle 62c on which the chuck 62 is secured by a screw 62c' and dowel pin 62c2, reciprocation being imparted to the chuck 62 and spindle 62c by means of a cam 62d, which is adjustably mounted on a cross shaft 62e having bearing in the side frame plates 38a of the main frame of the apparatus, said cam actuating a lever 62f, which is adjustably pivoted at one extremity, the pivoting assembly being supported from the frame 63, and at its opposite extremity pivotally secured to a pitman 62g, the pitman connecting with spindle 62c by means of a cross fork 62h, which is adjustably secured to said pitman by nuts 62i at its one extremity and forked into an annular groove in the spindle 62c at its opposite extremity. The pitman 62g projects through and is guided by extensions 62j of the frame 63, the upper end of said pitman having adjustably threaded therein a contact screw 62k, the function of which will later become apparent.

Rotation may be imparted to the spindle 64 in the unit illustrated in Fig. 3 by means of cooperating friction gears 64g and 64h, the gear 64g being adjustably secured on the spindle 64 and the gear 64h splined for longitudinal sliding movement on a cross shaft 64i, which is preferably continuously driven, this shaft having bearing at opposite extremities in the side frame plates or beams 38a.

The friction gears 64g and 64h are brought into intermittent contact by a lever and brake assembly comprising a brake shoe 64j formed with studs for mounting the shoe for vertical movement on the frame 63, a bellcrank lever 64k pivoted or fulcrumed in said frame, a connecting rod 64l adapted to be adjustably pivoted at one extremity in any one of a plurality of holes formed in said bellcrank lever and at its opposite extremity adjustably secured by nuts 64m on a pitman 64n, and cam contacting arms 64o and 64p which are also adjustably secured on the pitman 64n by nuts 64q and 64r. These arms 64o and 64p are alternately raised and lowered by separate cams, not shown, which are adjustably mounted on the shaft 62e and have a contour substantially similar to the valve cams shown in Fig. 9. The frame 63 is formed with guide brackets 64t for the pitman 64n.

To vary the speed of rotation of the chuck during reciprocation thereof, the splined friction gear 64h is provided with a grooved hub 64h', also splined on shaft 64i, and a grooved cam 64h2 is adjustably secured on shaft 62e, motion being transmitted from the cam to said gear by a lever 64h3, which is adjustably pivotally supported at its upper extremity on a bracket extension 63e of the frame 63, said lever extending downwardly and adjacent cam 64h2 being provided with a pin 64h4 working in the groove of said cam, and at its lower extremity said lever connects with the grooved hub 64h' by a link 64h5 and pin 64h6 working in the groove of said hub.

In operation, the chuck reciprocating cam 62d and brake cams being adjusted to work in synchronism, when the chuck spindle and chuck elevate, the brake 64j is released permitting spindle 64 to lower and thus lowering gear 64g into contact with the continuously rotating gear 64h and imparting rotation to the chuck; and when the chuck is lowered, brake 64j is raised and thus contacts with gear 64g and raises the spindle 64, thereby moving gears 64g and 64h out of contact and stopping rotation of the chuck.

To gradually accelerate and decelerate or vary the speed of rotation of the chuck during reciprocation thereof, the drum cam 64h2 and lever 64h3 may be used to move the gear 64h relatively to gear 64g. Ordinarily, however, the brake, if properly adjusted, will operate to effect gradual contact and release of the gears 64g and 64h and provide for smooth operation of the chuck 62.

The shaft 64i, on which the continuously driven

gears 64h are splined, and the cam shafts 62e are arranged so that they may be driven from the main drive shaft 44, or, as shown in Figs. 10 and 12, the shafts 64i may be driven from an independently driven shaft 66 and the shafts 62e from shaft 44, (note Figs. 10 and 10A and the reduced view Fig. 12), the drive being transmitted by helical gears 67 and 67a, the gears 67 being adjustably secured on the shafts 66 and 44 and the gears 67a on the cross shafts 62e and 64i. The speed of rotation of shafts 62e and 64i may be independently varied along the fabricating line by simply changing the ratio of gears 67 and 67a. These latter gears are used at various points in the entire apparatus, as will be noted in Fig. 1.

The shaft 66 is supported in bearing brackets 66a, which project at intervals from the main frame of the machine, said shaft being driven by a motor 66b (see Figs. 10 and 19).

Super and sub-atmospheric pressure and other mediums may be applied to the molds through the chuck for various fabricating operations, the passages 62a and 62b extending down into the chuck spindle 62c as shown and opening out into annular registering air grooves 62a' and 62b' formed in a hood 70 having a working fit around said spindle and adjustably supported on the frame 63 by a thread rod 70a, hose nipples 62a2 and 62b2 being threaded into the hood 70 and communicating with said grooves. A further communicating passage opening out in the bottom of the chuck is provided by a bore 71 in the screw 62c', the interior of the spindle 62c being hollow, thus forming a chamber 71a, and the hood 70 having a further groove 71b in communication with said chamber, a hose nipple 71c being threaded into the hood 70 and communicating with said groove. Where the passages 62a, 62b and 71 open out into the chuck 62, resilient sealing and cushioning pads 62l are adjustably threaded into said chuck.

Thus at stations P or F are located these units which are capable of lifting molds and ware off the conveyor and providing the desired ware manipulation during decoration. In Figs. 10 and 10A, the decorating assembly is shown installed in the fabricating line adjacent the dryer, at which point the ware will have been shaped by the profile and be still in a soft or plastic state. At this point, it may be desirable to apply a coating of slip such as engobe, clay in a more or less plastic state and of a different color relatively to the ware, powdered, granular or fluid coloring or decorating material, and analogous decorative as well as utility mediums. However, the apparatus may be installed at any point along the fabricating line, for instance, at the stations P or F as previously mentioned.

The decorating attachments, Figs. 2 and 16, may be mounted on the turret 88 through the medium of the trunnion gear 89a (see Figs. 7 and 8). In Fig. 2 an attachment particularly adapted for decorating and shaping the interior of deep ware is shown, and comprises a decorating wheel 96l which is illustrated as being supported from a crosshead 96i which is secured in angular spotted position to the gear trunnion 89b by the pin or screw 89e, said crosshead being slotted for adjustable securement of bracket 96j, decorating unit designated by 96l, being pivotally secured to said bracket.

The member 96l is shown in the form of a wheel which is rotatably mounted on a trunnion, shown in section, formed on a supporting bracket 96l' and secured against displacement by a collar 96l2, a gear 96l3 being cast integral with or secured on said wheel, said gear 96l3 meshing with a drive pinion or gear 96l4, which is secured on a trunnion having gearing in the bracket 96l'. The drive is applied to pinion 96l4 by means of gears 96l6 and 96l7 and a flexible drive coupling similar to that shown in Fig. 4, the gear 96l6 being secured on the trunnion 89b, and the gear 96l7 being mounted on an extension of crosshead 96i.

The wheel 96l is formed with an annular chamber 96l8, the material being fed to this chamber through hose 96l5 which is connected to a bore formed in the bracket 96l' and the wheel trunnion and communicating with said chamber through a plurality of radial holes in said trunnion and grooves or a slot 96l9 formed in said wheel, as shown in the drawings.

While the wheel 96l is shown as provided with a driving means, it will be obvious that it could be rotated through friction with the ware or mold. However, by driving the wheel in synchronism with the rotation of the attachment and/or mold, accurate laying of the pattern, encrustation, design, etc., is ensured.

The wheel 96l is capable of producing effects too numerous to mention, the working surfaces of both the wheel and member 96k, Fig. 16, being adapted for applying any desired configuration or design, either engraved or in relief and with or without additional material.

With reference to Fig. 16, the unit 96k is shown as comprising a cylinder 96k', said cylinder having a piston 96k2 therein, compression spring 96k3 and guide pin 96k4, the cylinder being provided with adjustable heads or bushings, one of which is provided with air exhaust vents which also serve as sockets for a spanner wrench or analogous tool while the piston stem has a sliding fit in the other, the member 96k being secured on said stem.

In this instance, the material is preferably supplied through the charger 95, the hose 95e2 being attached to the nipple 73e4, (see Fig. 6) and a T-head nipple being secured in the passage 73e3, Fig. 16, to which flexible members or hose 96k5 and 96l5 are secured, the hose 96k5 connecting with a chamber 96k6 formed in the member 96k and communicating with the clay contacting surface of said member through ducts or vents 96k7.

The piston 96k2 (see Figs. 6, 8 and 16) is preferably retracted by air or other fluid under pressure and advanced by a spring 96k2'. Air under pressure is conducted to the piston chamber through hose 96k8, line 73f3, groove 73e2, line 73e', and nipple 73e4, the latter being a connection to which a hose leading to a control valve (shown in application Serial No. 13,683) is attached. The control valve is so constructed that it may be selectively adjusted to cause the operation of the piston at such intervals as may be desired.

Ordinarily, however, when one or a plurality of the units 96k are used, the work may be efficiently performed by simply reciprocating the plunger 96k2 and intermittently rotating the mold, or the ware may be coated or ringed by simply moving the member 96k or 96l into contact with the ware and rotating the mold or attachment.

Both forms of decorating units 96k and 96l are shown mounted to operate in connection with one attachment for the purpose of illustration, but either one or the other or a plurality of each may be used together or separately.

Either or both the mold and/or the atachment may be reciprocated and/or rotated. In case intermittent reciprocation and rotation of the attachment is desired, the cams **96e** and **96f** may be found suitable, also cam **96g**, Figs. 13 and 14.

The attachments and ware are capable of practically any desired relative reciprocatory, rotative and angular movements by simple and obvious modifications in the contour or the actuating cams and proper adjustment of parts. Fig. 15 illustrates diagrammatically a number of the operating positions of the attachment and mold. Beginning at the left, the attachment is shown working in vertical concentric alignment; next the attachment and mold are shown working in the same horizontal plane but out of vertical alignment; next the attachment is shown working at an angle or tilted and in concentric rotary relation with the mold while the following position shows the attachment at an angle and in eccentric rotary relation with the mold, and the last position shows the attachment and head working at right angles.

Various combinations of the foregoing working positions, too numerous to mention, may be effected, and as the cams and levers may be adjusted while in operation to adjust the phase and extent of movement of the parts controlled thereby, these working positions may also be varied and adjusted while the decorating or other operation ensues.

In regard to supplying the wheel **96l** and decorating device **96k** with fluid, coloring or decorating material, there is provided a charging device, Fig. 9, which comprises a casing **95** which may be adjustably supported from one of the top frame plates **38c** by a bracket **95a**, the lower extremity of which is of angle shape and bored to receive an externally threaded sleeve **95b**, the latter being adjustably secured by nuts **95c**, the lower extremity of said sleeve terminating in an externally and internally threaded socket head which is threaded into the casing **95**. The casing **95** is provided with an inlet port **95d** and outlet port **95e** controlled by check valves or analogous means, the port **95d** having a pipe or hose connection **95d'** with a source of supply such as a tank **95x** or the like, and the port **95e** having connected thereto a pipe **95e'** formed with a valved T-head, to which a pipe or hose member **95e2** is connected, which leads to the point of application, the hose **95e2** being herein referred to as the one used for conducting colored decorating material to the applicators.

The casing **95** is shown as being formed with additional ports **95f** and **95g**, the ports **95f** having a pipe connection **95f'**, provided with a check valve assembly **95f2**, said pipe **95f'** leading to the supply tank, the object being to expel any decorating fluid that may enter the casing chamber above the piston **95h** or which may leak past said plunger, and the port **95g** is also provided with a check valve assembly **95g'** to which a hose or the like **95g2** may be connected for withdrawing excess material when the device is used for appendage work, or the port **95g** may remain open and serve simply as an air inlet port. A plug **95g3** is shown inserted in the casing **95** below port **95g**, to provide for interchangeability of the position of said port.

The plunger **95h** is secured on the lower extremity of a stem **95h'**, which has a working fit in the sleeve **95b**, a packing gland **95h2** being threaded in the socket head of said sleeve and the piston **95h** also being provided with the usual rings or analogous means to prevent leakage, said stem projecting upwardly through an arm **95a'** of bracket **95a**, a compression spring **95h3** being mounted on said stem and bearing at its upper end against an externally threaded adjusting collar **95h4**, which is threaded into the arm **95a'**.

The plunger is reciprocated by means of a lever **95i**, adjustably pivotally supported at one extremity from a post **95i'**, which is secured to and depends from one of the top plates **38c**, and at its opposite extremity said lever is bifurcated and pivotally secured to a pivot block **95h5** which is adjustably secured on stem **95h'** by upper and lower collars **95h6**. Lever **95i** is provided with a cam roller **95i2**, adapted to contact with a cam **95i3**, which may be adjustably mounted on one of the cross shafts **80a**.

It will be noted that the pressure of piston **95h** on the charge may be regulated by adjusting spring **95h3**, which may ensue while in operation, and as the fulcrum point of lever **95i** and angular position of cam **95i3** may be varied while in operation, the reciprocation and phase of reciprocation of said plunger may be likewise varied, to thereby measure the charges of material and time and pressure of application of the same while the device is operating to deliver the charges.

In some instances, it may be desired to vary the stroke of the charger plunger **95h** independent of the cam **95i3**, or impart a series of pulsations of varying extent to said plunger, and when such operation is desired, a reduction gear such as Geneva gear **95l** may be secured on a stub shaft **95l'**, which may be mounted in bearings adjacent shaft **80a**, and a motion plate **95l2** adjustably secured on the shaft **80a** and adapted to intermittently actuate the Geneva gear **95l**. Charge measuring screws **95l3** are shown as adjustably mounted in spaced relation around the periphery of a wheel or disk **95l4** which may form part of the Geneva gear **95l**, these screws corresponding number to the slots in the Geneva gear. A further contact member or screw **95l5** is adjustably mounted in a side bracket on lever **95i**, said screw being adapted to contact with the screws **95l3** at each intermittent partial revolution of the Geneva gear **95l**. By adjusting contact screws **95l3** relatively to screws **95l5**, the stroke of the charger plunger **95h** may be correspondingly varied independent of the cam **95i3**, and by adjusting contact screw **95l5** independent of screws **95l3**, the complete cycle of strokes may be varied without varying each individual stroke.

Thus, in the case of the wheel **96l** colored decorating fluids are supplied to the chamber thereof through the charger **95**, hose **95e2**, Fig. 9, nipple **73f4**, Fig. 6, orifice **73f**, Fig. 8, passage **73f'**, groove **73f2**, line **73e3** and hose **96l5**. The same fluid supplying system is utilized for the decorating attachment of Fig. 16, except that hose **96k5** is employed between the applicator and the pipe **73e3**.

It will be noted that the apparatus shown in Figs. 1, 2 and 3 are arranged in substantially the relative position occupied thereby when in assembled relation, except that the attach bracket **88**, Fig. 2, is turned 90° from the position shown to mount the same on plate **86**, Fig. 1. This assembly may be mounted at P or F, Figs. 10 and 10A, and the number of assemblies depends on the number of lines of production, which, as illustrated in Fig. 8, is shown to be two, although the machine actually has four lines of

production, as shown in the parent application, wherein ware of diverse character such as plates, bowls, cups and kindred articles as stated therein are made.

The drive for the assembly at station P or F comprises shaft 80a, Figs. 5 and 10, which is driven by gears from shaft 80. Shafts 80 and 44 are provided with sprocket gears and connected by a sprocket chain or analogous member 80c and driven in synchronism. Shaft 44 has a gear 67 driving gear 67a, Fig. 12, on cam shaft 62e which raises and lowers the chuck 62. Shaft 66 may be independently powered by motor 66b and this shaft is connected by gears 67 and 67a, Fig. 12, driving shaft 64i which rotates the chuck 62. Shaft 80 is driven by chain 80d, Fig. 10, which transmits power from overhead shaft 80', Fig. 19, driven by main drive motor 80e through gears 80f and 80g.

It has been stated hereinbefore that the shaft 86b may be maintained stationary by tightening screw 86j, Fig. 4. The drive shaft 87c'—87c2 is, of course, disconnected when this is done. Obviously, with shaft 86b held against rotation, then gears 89 and 89a, Figs. 7 and 16, are locked thereby holding bracket 96i stationary on sleeve 89b and, as will be obvious, the bracket may be locked in any angular position desired with this arrangement.

To adjust the wheel 96l to the position illustrated in the right hand diagram, Fig. 15, the flexible drive 3—4, Fig. 2, is disconnected and the arm 96j loosened and turned approximately 90° to a position paralleling the slot in the bracket 96i. The wheel 96l can then be loosened on the arm 96j, swung to a vertical position and tightened. If it is desired not to drive the wheel and to permit it to be rotated by contact with the work as hereinbefore mentioned, the drive simply remains disconnected. It will be obvious from the foregoing how adjustment may be made to relocate the wheel to correspond with the other positions of adjustment shown in Fig. 15.

Where the bracket 96i is turned at right angles to shaft 86b and locked in this position with the decorating wheel adjusted to the position shown in the right hand diagram, Fig. 15, it will be obvious that the shaft 86b and consequently the decorating wheel 96l may be shifted radially either in contact or out of contact with the ware or lifted and lowered as desired.

Where it is desired to decorate ware in succesison but with different decoration, a bracket 96i may be mounted from each of the four extensions 5 of attachment 88, Fig. 7. After one or more pieces have been decorated, the attachment 88 is rotated by rack 86d, Fig. 1, to bring the next decorating device into working position.

The reference character M, Fig. 2, designates a ware support bearing ware adapted to be transported by conveyor 1 to a position over chucks 62 at the decorating stations P or F. Said chucks raise and lift the support out of the open bottom trays of the conveyor toward the decorating instrument 96l. Suction may be applied to the support whilst seated in the chuck to grip the same thereto. The ware supports may be hollow as shown to accommodate hollow ware or may have a raised surface for the reception of flat ware. All is described in greater detail in the parent application.

What I claim is:

1. An ornamenting machine of the class described, comprising an intermittently movable work supporting means, means for actuating said movable work supporting means, an ornamenting station adjacent said work supporting means including a movably mounted applicator engageable with the work carried by the work supporting means when the work supporting means is stationary, and means controlled by the means actuating said work supporting means for actuating said movably mounted applicator.

2. In an ornamenting device of the class described, an applicator station including an applicator, means for supplying paint thereto, and cam actuated automatic means for traversing said applicator with respect to the ware to obtain bands of different widths.

3. In an ornamenting device of the class described, an applicator station including a pivotally mounted applicator, means for supplying paint thereto, and cam actuated automatic means for traversing said applicator when the same is in engagement with the ware to obtain bands on the ware of different widths.

4. In an ornamenting device of the class described, an applicator station including a slidably mounted rod, an applicator arm secured thereto, an applicator on said arm, resilient means normally urging said rod in one direction, and means for sliding said rod predetermined distances in the other direction for effecting a traversing of the applicator with respect to the ware to obtain bands thereon of different widths.

5. In an ornamenting device of the class described, an applicator station including an applicator, and cam actuated means for traversing said applicator predetermined distances on the ware when the same is in engagement with the ware for obtaining bands thereon of different widths.

6. In an ornamenting device of the class described, an applicator station including a paint receptacle, a rotatably and sliding mounted rod, an applicator support adjustably secured to said rod, an applicator mounted on said applicator support, means for conveying paint from the receptacle to said applicator, means for rotating said rod to move the applicator into and out of engagement with the ware, means urging said slidable rod in one direction, and means for sliding said rod in the opposite direction thereof when the applicator wheel is in engagement with the ware to effect a traversing of the applicator wheel with respect to the ware.

7. In an ornamenting device of the class described, an applicator station comprising a rotatably and slidably mounted applicator support, an applicator secured to said support, means for supplying paint to said applicator, means for rotating said support to move the applicator into and out of engagement with the ware, means slidably urging said support in one direction and adjustable means for sliding said support in the opposite direction thereof when the applicator is in engagement with the ware to effect a traversing of the applicator with respect to the ware.

8. In an ornamenting device of the class described, an applicator station comprising, a rotatably and slidably mounted applicator support, an applicator arm secured to said support, a paint applicator on said arm, means for supplying paint to said applicator, means for rotating said support to move the applicator into and out of engagement with the ware, an adjustable cam means for sliding said support predetermined distances when the applicator is in engagement with the ware to effect a predetermined traversing of the applicator with respect to the ware to obtain bands of different widths thereon.

9. An ornamenting machine of the class de-

scribed, comprising an intermittently movable work supporting means, means for actuating said work supporting means, an ornamenting station adjacent said work supporting means including a movably mounted applicator, means for supplying paint to said applicator, said applicator being engageable with the work carried by the supporting means when the work supporting means is stationary, means controlled by the means actuating said work supporting means for actuating said movably mounted applicator, and means for traversing said applicator with respect to the work for obtaining bands thereon of different widths.

10. An ornamenting machine of the class described, comprising an intermittently movable work supporting means, means for actuating said work supporting means, a plurality of spacedly disposed ornamenting stations disposed adjacent said work means, including, a movably mounted applicator, said applicator being engageable with the work carried by the supporting means when the supporting means is stationary, means for supplying paint to the applicator, and means controlled by the means actuating said work supporting means for actuating said movably mounted applicator.

11. An ornamenting machine of the class described, comprising an intermittently movable work supporting means, means for actuating said work supporting means, an ornamenting station adjacent said work supporting means including a movably mounted applicator engageable with the work carried by the supporting means when the supporting means is stationary, a centering device for centering the work carried by the supporting means disposed adjacent said supporting means, and means controlled by the means actuating said work supporting means for actuating said movably mounted applicator and the centering device.

12. An ornamenting machine of the class described, comprising an intermittently movable work support, rotatably mounted spacedly disposed chucks carried by said support for supporting the ware, means for rotating said chucks, means for intermittently moving the work support, and a plurality of spacedly disposed ornamenting stations adjacent said work support, and engageable successively with the work carried by the chucks, each of said ornamenting stations including a movably mounted applicator, engageable with the work carried by the chucks when the work support is stationary, means for supplying paint to said applicators, and means controlled by the means actuating said work support for actuating said movably mounted applicators.

13. In an ornamenting device of the class described, an applicator station including an applicator, said applicator being mounted for traversing movement with respect to the ware, means normally urging said applicator in a predetermined position with respect to the ware, and means for moving said applicator predetermined distances in the opposite direction thereof for obtaining bands on the ware of different widths.

14. A banding machine comprising a shaft, a rotatable banding disk on said shaft, means for supplying decorating material to said disk, a rotatable shaft substantially perpendicular to said first mentioned shaft, said second named shaft being movable axially, a chuck carried by said second shaft for supporting a substantially circular disk like article for rotation about the axis of said second shaft with the peripheral regions thereof intersecting the plane of said disk, means for moving said second shaft axially, and means for rotating said banding disk.

15. A banding machine comprising a shaft, a rotatable banding disk on said shaft, means for supplying decorating material to said disk, a rotatable shaft substantially perpendicular to said first mentioned shaft, said second named shaft being movable axially, means for varying the angularity of said shafts, a chuck carried by said second shaft for supporting a substantially circular disk like article for rotation about the axis of the second shaft with the peripheral regions thereof intersecting the plane of said disk, means for moving said second shaft axially and means for rotating said banding disk.

16. A banding machine comprising a shaft, a rotatable banding disk on said shaft, means for supplying decorating material to said disk, a rotatable shaft substantially perpendicular to said first mentioned shaft, means for varying the angularity of said shafts, said second named shaft being movable axially, a chuck carried by said second shaft for supporting a substantially circular disk like article for rotation about the axis of said second shaft with the peripheral regions thereof intersecting the plane of said disk, means for vacuumizing said chuck, means for moving said second shaft axially, and means for rotating said banding disk.

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