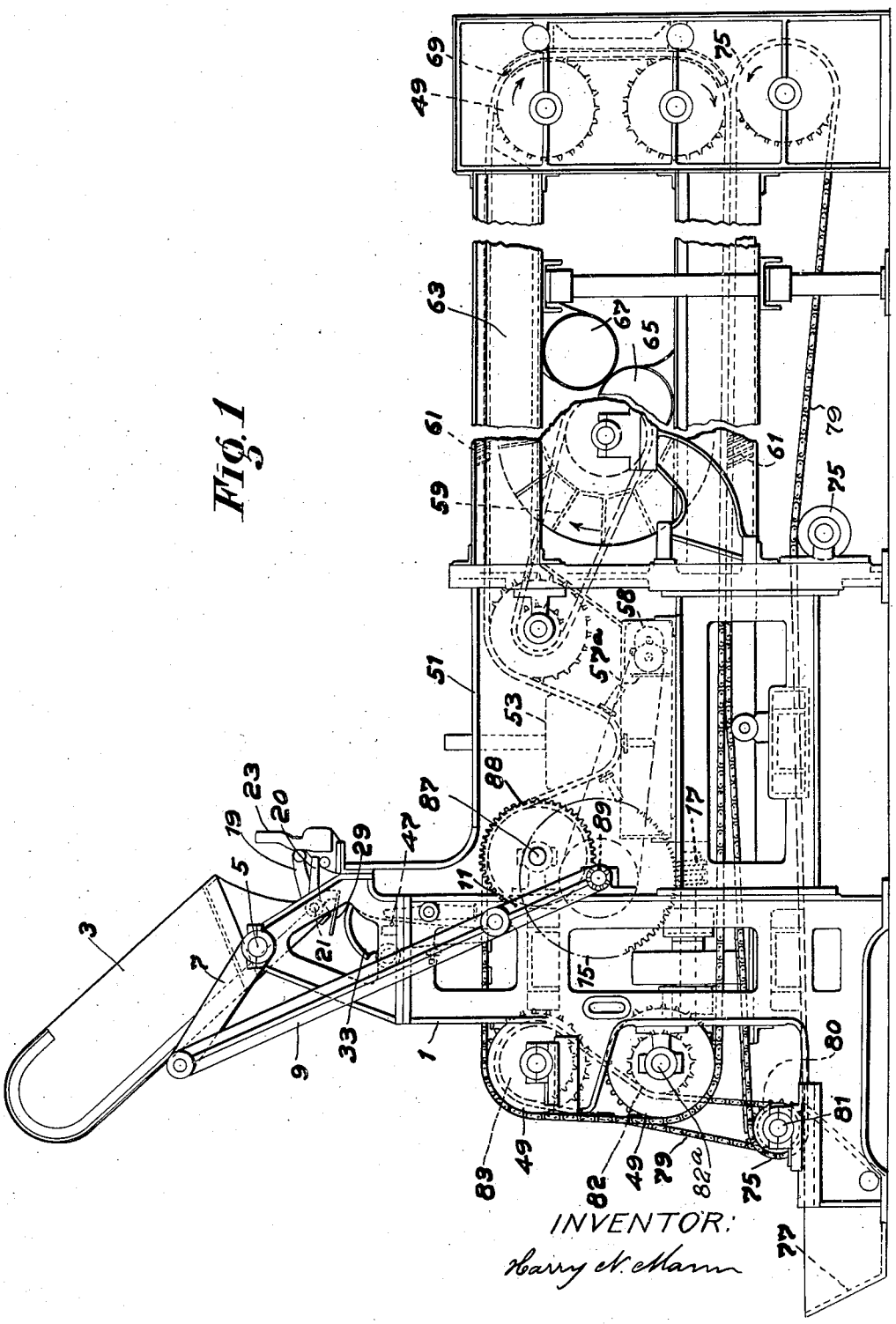
July 15, 1930. H. N. MANN 1,770,620

MACHINE FOR LACQUERING LOADED SHOT SHELLS

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Fig. 1



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MACHINE FOR LACQUERING LOADED SHOT SHELLS

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Fig. 2

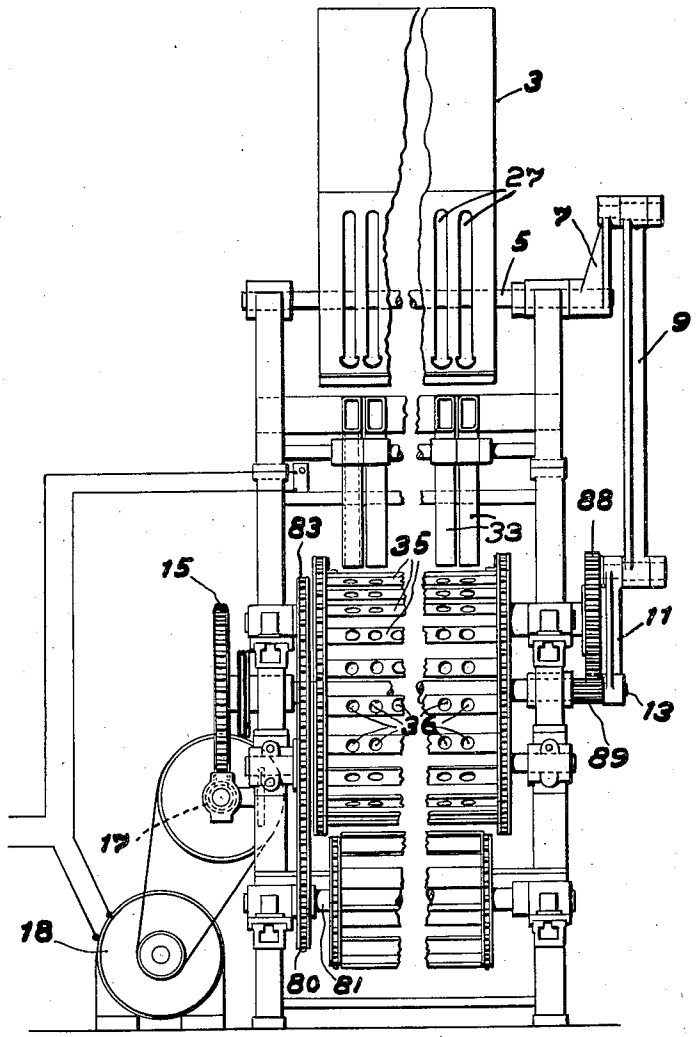
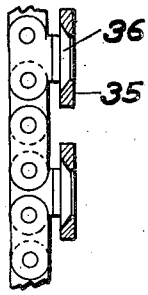


Fig. 9



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Fig. 3

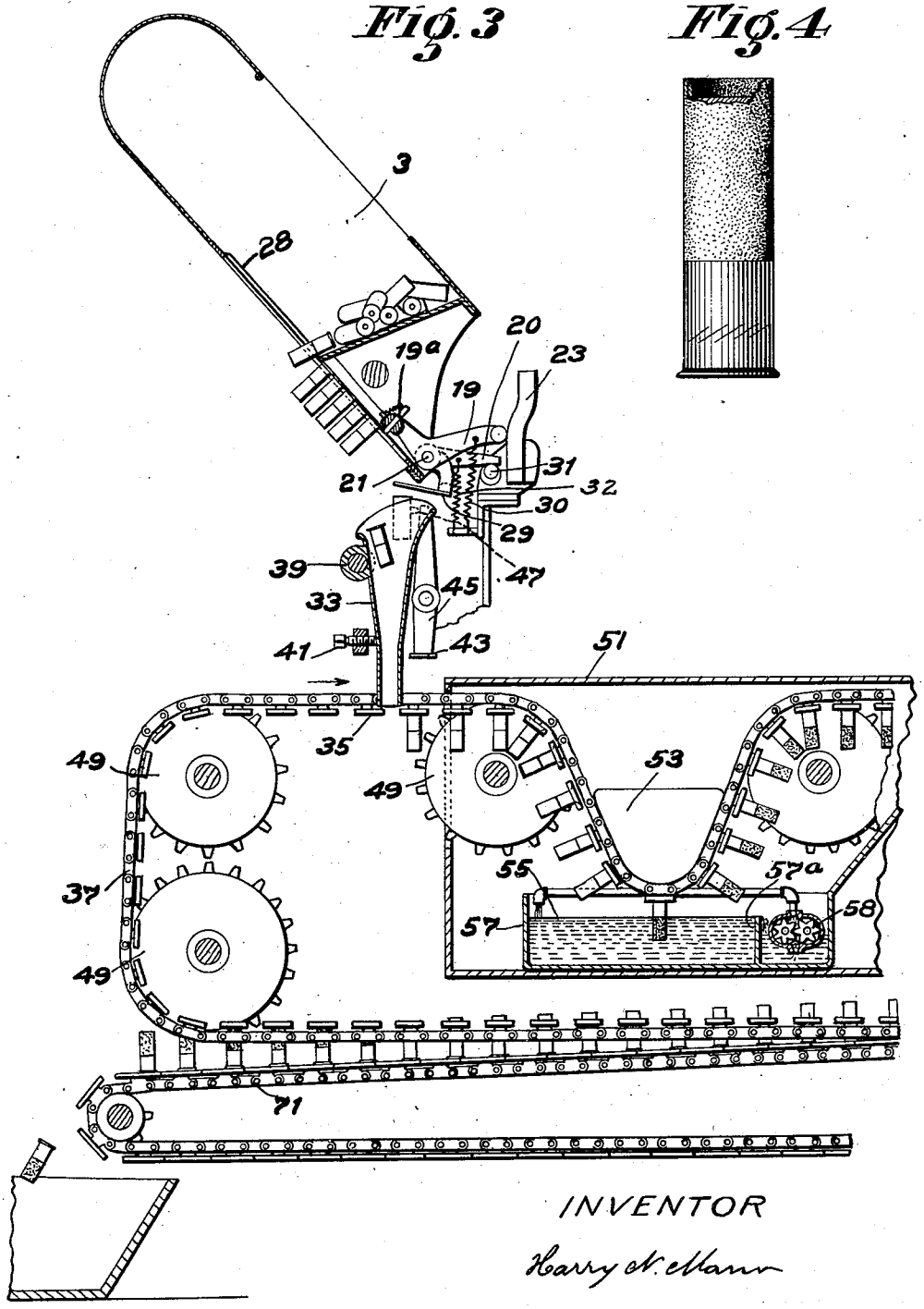


Fig. 4

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MACHINE FOR LACQUERING LOADED SHOT SHELLS

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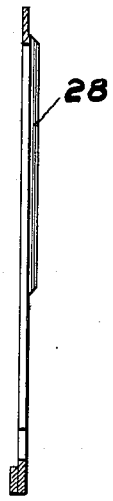


Fig. 6

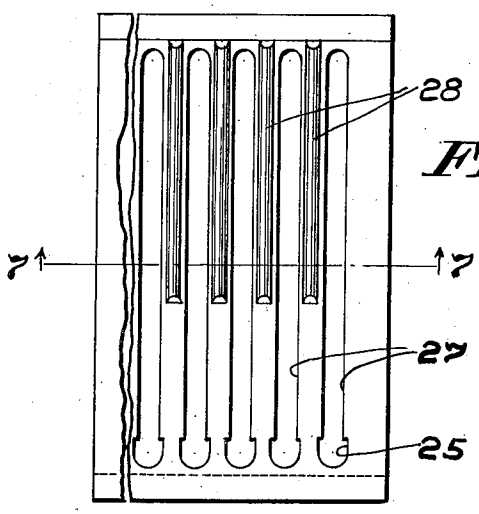


Fig. 5



Fig. 7

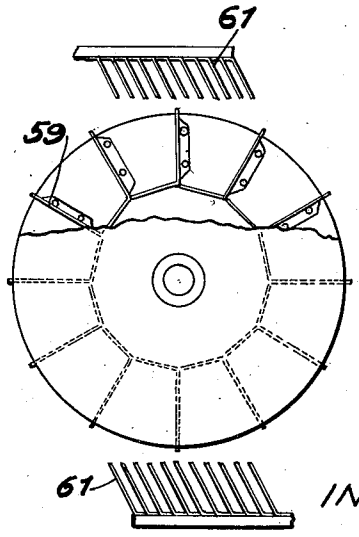


Fig. 8

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UNITED STATES PATENT OFFICE

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MACHINE FOR LACQUERING LOADED SHOT SHELLS

Application filed February 20, 1928. Serial No. 255,545.

This invention relates to a machine for lacquering loaded shot-shells or cartridges such as are used for shot guns and has particular reference to the coating of the non-metallic portions of such shells with a nitro-cellulose lacquer whereby the non-metallic portions are waterproofed and are rendered impervious to moisture and thus better adapted to retain their uniform size and condition despite exposure to water or moisture in any form. Loaded shells may be lacquered whether or not they include waterproofed material treated with paraffine, petroleum, or any of the well known compounds used by manufacturers of loaded shoe-gun shells. In addition to rendering the non-metallic material itself impervious to water, the crevice between the exposed wad and the inturned or crimped end of the paper cylinder abutting against the wad is filled so as to prevent the ingress of water. It is the object of this invention to provide a machine for uniformly lacquering the exposed portions of such shot-shells in an efficient and uniform manner.

In the drawings:

Fig. 1 is a side elevation of the machine;

Fig. 2 is an elevation of the head or feed end of the machine;

Fig. 3 is a side elevation of certain of the feed and dipping parts of the machine illustrating certain steps in the method of dipping as well as the mechanism employed in carrying out such method;

Fig. 4 is an elevation of a shot-shell with a portion broken away so as to better illustrate the exposed or end wad and the abutting inturned end of the paper cylinder;

Fig. 5 is a view showing in detail the means for aligning the shells preparatory to dropping them from the hopper;

Figs. 6 and 7 are respectively an elevation and cross-section of the same portion of the machine;

Fig. 8 shows in side elevation a revolving gate and air friction devices at the top and bottom thereof for the purpose of closing off the drying zone of the machine; and

Fig. 9 shows a cross-section of conveyor bars with connecting links of the chain in elevation.

Referring to the drawings, and especially to Figs. 1, 2 and 3, there is shown a machine having a frame generally designated at 1, which frame carries and associates the various parts at the drive and feed end of the machine. These parts include a movable hopper 3 affixed at one end to a rock shaft 5 which raises and lowers the hopper 3 through the medium of a crank 7 affixed to the rock shaft 5, link 9, and crank 11, carried by and driven from the shaft 13 through the medium of a worm wheel 15 and worm 17 which is suitably rotated by an electric motor 18.

The feed hopper 3 has a slotted bottom (see Figs. 5–7) which is adapted to receive and align the shells placed in the hopper in hit or miss fashion, so that the shells hang by their flanged ends in aligned rows so that the end shell of each row may be simultaneously dropped from the hopper by the timing device. The latter includes a lever member 19 carrying a series of separate spring pressed finger members 19^a, the lever 19 being pivoted on a shaft 21 carried in one end of the hopper. The lever member 19 is actuated through the up and down motion of the hopper 3 by reason of its contact with the opposed fixed cam 23 with which the opposite end of the lever member 19 contacts. The spring 20 holds the lever 19 against the cam 23, each finger member 19^a holds a row of shells from sliding down to the enlarged ends 25 of the slots 27, which enlarged ends 25 are sufficiently large to permit the flanged ends of the shot-shells to drop therethrough, the shells having been initially aligned by means of the deflectors 28 so that they drop into the slots 27 and hang therethrough as shown in Fig. 3. The shells are released from their respective slots through the medium of a pivoted trigger lever 29 which is actuated through the movement of the hopper 3 by reason of its contact with the fixed cam 31 against which the trigger lever is held by the spring 32. In this way a transverse row of shells, one shell from each slot, with flanged end uppermost is permitted to drop into a series of loading chutes 33 whereby the released shells fall and slide

downwardly through the loading chutes and are thereby guided into a perforated conveyor bar 35, the series of these conveyor bars having perforations sufficiently large to freely admit the cylindrical portions of the shells, with countersunk depressions 36 which receive and hold the flanged metallic ends of the shells. The conveyor bars 35 are connected to and carried by the chains 37 so that each perforated conveyor bar is under the series of loading chutes 33 at the proper time to receive the shells dropped into the loading chutes by the respective trigger lever 29. The loading chutes 33 are pivoted at 39 and are individually adjustable as to position by means of the set screws 41 so that each loading chute 33 may be adjusted to hang in line with its neighbor. The purpose of pivoting the loading chutes is to provide for the actuation of a safety stop device so that should a shell, for any reason, become jammed and but partially enter its hole in the conveyor bar 35, the upper portion of the shell which has not cleared its loading chute will swing the bottom end of such loading chute in the direction of movement of the conveyor bars so as to cause such loading chute to encounter and move slightly, a transverse stop arm bar 43 carried by the lower ends of the trip levers 45 one of which pushes the button of an electrical switch 47 so as to break the electrical circuit of the motor 18 driving the machine and so stop the conveyor before an accident occurs. Such a safety arrangement is necessary for should a loaded shell become jammed in the moving machine, there might be disastrous consequences.

The chains 37 that carry the conveyor bars 35 are driven over a series of sprockets 49 and carry the shells within a closed casing 51 where the lacquer is applied, drained, and hardened before the shells emerge therefrom into the room. The chains with the filled conveyor bars upon passing into the casing 51 first descend under chain guides 53 so as to incline, and dip the shells into the lacquer bath 55 suitably maintained at a constant level in the tank 57 by means of the weir 57ª and belt-driven gear pump 58 which returns the overflowing lacquer to the bath.

It will be noted from Figs. 1 and 3 that the shells are dipped into the coating with their axes inclined at an angle to the surface of the bath and are removed at a different and, so to speak, opposite angle, the purpose of which is to uniformly coat the entire exposed non-metallic surface of the shell. This is done by carrying the shells into the lacquer at an angle so that whatever pocketed air remains rises and momentarily lags behind and then, as the shell is about to emerge, accelerates and moves to the opposite and leading side so that the lacquer can coat the uncoated inside surface where the pocketed air was interposed, the air moving across the inside of the cupped end of the shell and out into the casing 51. Thus the tipping of the immersed shell allows the entire inner surface of the cupped end of the shell to be coated with lacquer despite any entrapped air. The inclined emergence of the shells provides for the prompt elimination of drops of solvent which would otherwise have a tendency to form about the edge at the lower ends. Since the shells are carried out at an angle, the excess lacquer tends to collect and run to the lowermost portion of a given shell and drop therefrom instead of remaining in small separated drops at various points about the edge at the wad end of the shell. Upon emerging from the bath of lacquer, the shells are carried upwardly towards the next sprocket 49, the lacquer meanwhile having dripped from the lower ends of the inclined shells, and thence through a revolving gate 59 belt driven (as shown in Fig. 1) and air friction device 61 into an air channel or box 63 within the casing 51. The wings of the revolving gate move at the same lineal rate of speed as the conveyor bars and there are a sufficient number of wings so that the air cannot readily pass between the ends of these wings and the opposing edges of the air friction device 61 which minimize the amount of escaping air. Warmed air is passed into the air box 63 through the elbow 65 on the lower portion of the air box 63 surrounding the lower flight of the shell conveyor so that such air is forced into the lower run of the air box and is moved in a direction opposite the direction of movement of the conveyor, and then passes out of the upper portion of the air box at the elbow 67 adjacent the revolving gate 59. In this way the active hot air is confined to a U-shaped channel in the machine surrounding the coated shells and thus affords a drying zone separated from the dipping portion of the machine where the air is heavily laden with the volatile solvent. This is of importance as the heated air evaporates the solvent so quickly that the shells would not drain properly if any substantial amount of the heated air came in contact with them before the draining was completed. Heated air is supplied to the elbow 65 by suitable means (not shown) and the exhaust air carrying the solvent is sucked through the elbow 67 by suitable means (not shown). In practical operation it is preferred that a solvent recovery system be used in a manner as well known in the lacquer art, though this, of course, is not essential. All the dipped shells upon passing through the revolving gate 59 into the upper course of the hot air channel pass along this upper course until they reach the next sprockets 49 at the end of the upper flight preparatory to being held with their axes in a horizontal position as they pass down to the lower flight or run of the conveyor as shown. In order to retain the shells

in the conveyor bars 35 at this portion of their movement a fixed shield 69 is so placed as to keep the flanged ends from being displaced from the countersunk portions 36 of the conveyor bars 35 until the shells (now inverted) reach, and their flanged ends rest upon, a lower conveyor made up of imperforate bars 71, which bars are affixed to chains 73 running over the sprockets 75 and are moved at the same lineal rate of speed as the upper conveyor. This conveyor supports the inverted shells so that they are carried along through the lower half of the air box 63 until they pass through the revolving gate and past a second or lower air friction device 61. The shells then continue along with the two adjacent sets of conveyor bars being held in their same position with reference to the upper conveyor bars until the conveyor chains begin to diverge as clearly shown in Fig. 1. As the upper and lower conveyors continue their respective flights, they gradually separate until the shells, resting on the lower conveyor bars, are entirely clear of the upper conveyor bars in which they were initially deposited, and pass out over the end of the run of the lower conveyor to be received in a suitable shell receiving receptacle indicated at 77.

As shown in Fig. 1, the lower conveyor chains 73 are driven through the drive chain 79 which rotates the sprocket 80 affixed to the shaft 81 which also carries two conveyor chain sprockets 75 also affixed thereto. The drive chain 79 is driven through the sprocket 82 affixed to the shaft 82[a] which is driven through the upper conveyor chains and sprockets 49 also affixed so as to rotate the shaft 81, the upper sprocket 83 being simply an idler and free to turn upon its shaft. The upper conveyor chains 37 are driven through the shaft 87 by means of the two sprockets 49 affixed thereon and the shaft 87 is rotated through the spur gears 88 and 89 from the main drive shaft 13 carrying the gear 89.

Having described my invention, I wish to claim and secure by Letters Patent:

1. A shot-shell lacquering machine having, in combination, means to align and hold shells in a predetermined and standard relation and to uniformly present said shells in predetermined position to a dipping device, a dipping device adapted to hold the shells by their flanged ends with said ends uppermost and dip the shells downwardly and into a bath of lacquer with the respective axes of the shells inclined with reference to the surface of said bath of lacquer, means to cause said shells to emerge from said bath at a different angle of inclination and within a draining enclosure, and means for subsequently exposing said shells to a current of warm air whereby the solvent is evaporated from the lacquer coating on said shells.

2. A shot-shell lacquering machine having in combination, an endless conveyor adapted to hold loaded shot-shells by their flanged ends and with said flanged ends uppermost, means to align and uniformly present shells to said conveyor in pre-determined position, means adapted to cause said conveyor to carry said shells downwardly and into a bath of lacquer with the respective axes of the shells inclined with reference to the surface of said bath of lacquer, means to cause said shells to emerge from said bath at a different angle of inclination and within an enclosed draining space, means to maintain the surface of the bath of lacquer at a definite level, and means for subsequently exposing said shells to a current of warm air whereby the solvent is evaporated from the lacquer coating on said shells.

3. A shot-shell lacquering machine having in combination, an endless conveyor adapted to hold loaded shot-shells by their flanged ends and with said flanged ends uppermost, means to uniformly present shells to said conveyor, said means including a series of movable loading chutes the movement of the bottom of any one of which moves a device to stop the movement of said conveyor, means adapted to cause said conveyor to carry said shells downwardly and into a bath of lacquer with the respective axes of the shells inclined with reference to the surface of said bath of lacquer, means to cause said shells to emerge from said bath at a different angle of inclination and within an enclosed draining space, and means for subsequently exposing said shells to a current of warm air whereby the solvent is evaporated from the lacquer coating on said shells.

4. A shot-shell lacquering machine having in combination, an endless conveyor adapted to hold loaded shot-shells by their flanged ends and with said flanged ends uppermost, means to align and uniformly present shells to said conveyor in pre-determined position, means adapted to cause said conveyor to carry said shells downwardly and into a bath of lacquer with the respective axes of the shells inclined with reference to the surface of said bath of lacquer, means to cause said shells to completely emerge from said bath at a different angle of inclination and within an enclosed draining space wherein the air is maintained substantially heavily laden with solvent, and means for subsequently exposing said shells to a current of solvent free warm air whereby the solvent is evaporated from the lacquer coating on said shells.

5. A shot-shell lacquering machine having in combination, an endless conveyor adapted to hold loaded shot-shells by their flanged ends and with said flanged ends uppermost, means to uniformly present shells to said conveyor, means adapted to cause said conveyor to carry said shells downwardly and into a

bath of lacquer with the respective axes of the shells inclined with reference to the surface of said bath of lacquer, means to cause said shells to emerge from said bath at a different angle of inclination and within an enclosed draining space, and means for subsequently exposing said shells to a confined current of warm air whereby the solvent is evaporated from the lacquer coating on said shells, and a revolving gate adapted to admit shells to and confine the warm air substantially free of solvent.

6. A shot-shell lacquering machine having in combination, an endless conveyor adapted to hold loaded shot-shells by their flanged ends and with said flanged ends uppermost, means to align and uniformly present shells to said conveyor in pre-determined position, means adapted to cause said conveyor to carry said shells downwardly and into a bath of lacquer with the respective axes of the shells inclined with reference to the surface of said bath of lacquer, means to cause said shells to emerge from said bath at a different angle of inclination and within an enclosed draining space, and means for subsequently exposing said shells to a current of warm air whereby the solvent is evaporated from the lacquer coating on said shells.

7. A shot-shell lacquering machine having in combination an endless conveyor adapted to hold loaded shot shells by their flanged ends and with said flanged ends uppermost, a hopper for supplying the shells to said conveyor, means in said hopper to align said shells and position them with their flanged ends uppermost, means to transfer said shells as positioned to said conveyor, means adapted to cause said conveyor to carry said shells into a bath of lacquer and along a path inclined with reference to the surface of said bath and to cause said shells to emerge from said bath along a path of different inclination and within an enclosed draining space, and means for subsequently exposing said shells to a confined current of warm air whereby the solvent is evaporated from the lacquer coating on the shells, and a revolving gate adapted to admit shells to and confine the warm air.

8. A shot-shell lacquering machine having in combination an endless conveyor adapted to hold loaded shot-shells by their flanged ends and with said flanged ends uppermost, a hopper for supplying the shells to said conveyor, means in said hopper to align said shells and position them with their flanged ends uppermost, means to transfer said shells as positioned to said conveyor, comprising a series of movable loading chutes, the movement of the bottom of any-one of which moves a device to stop the movement of said conveyor, means adapted to cause said conveyor to carry said shells into a bath of lacquer and along a path inclined with reference to the surface of said bath and to cause said shells to emerge from said bath along a path of different inclination and within an enclosed draining space, and means for subsequently exposing said shells to an enclosed draining space, means for subsequently exposing said shells to a connfied current of warm air whereby the solvent is evaporated from the lacquer coating on the shells, and a revolving gate adapted to admit shells to and confine the warm air.

HARRY N. MANN.