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METHOD OF SUPERWATERPROOFING SHOTGUN SHELLS

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The present invention relates to a process for preparing paper tubes for use in the manufacture of shot gun shells and has for one of its objects the provision of a process by which the shells are given very superior waterproofing qualities.

Another object of this invention is to provide a process which greatly strengthens the shell and offers greater resistance to cut-off.

A further object of this invention is to seal the joint between the top wad and the crimp which holds it in place so as to increase the water resisting properties thereof.

The present invention is an improvement in the process disclosed by me in my Patent #1,657,584.

The invention is exemplified in the process and combination of steps described in the following specification, and is more particularly pointed out in the appended claims.

The earlier method of waterproofing tubes for shot gun shells comprises the steps of forming the tubes by rolling them from paper sheets, sizing the tubes to a suitable diameter by passing them through dies, and thereafter impregnating the tubes with melted paraffin and cutting them into proper lengths for use in the manufacture of the shells.

Shot gun shells formed from tubes waterproofed by this process were not very satisfactory and were not uniform.

In the above noted patent, I have disclosed a process in which a drying oil is placed on the tubes prior to passing these tubes through dies. Thereafter, the tubes are passed through the dies and the drying oil acts both as a lubricant and as a coating for the tubes which is deposited thereon in a thin layer as it passes through the dies to impart thereto better waterproofing qualities. The tubes are then impregnated with wax applied to the tubes in a vacuum chamber as is more specifically set forth in said patent. Tubes produced by this process give far better results than those wherein only the wax is used as a waterproofing substance.

It is the object of the present invention to greatly increase the waterproofing qualities of shot gun shells by placing a substantial coating of a drying oil on the surface of the tube after the ironing operation and to seal the joint between the wad placed over the charge in the shell and the crimped portion of the shell which holds the wad in place. I will now proceed to describe this process more fully.

After the tubes have been formed, a coating of a drying oil, such as Perilla oil, is placed thereon and the tubes are passed through sizing dies, as is done in my patent previously referred to. After the tubes have passed through the sizing dies, they are given another coating of a drying oil, preferably Perilla oil, and this coating is of a substantial thickness, as compared with the very thin film of oil produced on the tubes during the ironing operation. However, the coating given to the tubes should not be so great as to cause the oil to run as it is desirable always to maintain a uniform coating on the tubes. This oil may be sprayed on by means of a suitable spray, or a brush or any other suitable means may be used to apply the oil.

The Perilla oil composition used in producing this last-mentioned coating comprises Perilla oil containing 0.2% to 0.5% of a suitable dryer. The Perilla oil and the dryer are incorporated together by blowing air through the mixture at a temperature of approximately 400° F. Suitable dryers for this purpose are lead oleate, lead linoleate, zinc oleate and cobalt acetate, the latter being preferred. The purpose of the dryer is to reduce the time which the Perilla oil takes for drying.

However, I am not restricted to using the above named dryers with Perilla oil for I have found that I can use Perilla oil with about 5 to 15% of a metallic soap, such as aluminum stearate, to produce the desired drying effect on the Perilla oil. Or I may use in place of aluminum stearate, aluminum palmitate, copper oleate, zinc stearate or any other suitable insoluble soap. Or, if desired, I may use a combination of the dryers listed in the preceding paragraph with any of the insoluble soaps just mentioned to produce the desired drying effect upon the oil.

Other substances which may be used for

coating the tubes after the ironing operation are nitrocellulose lacquer or nitrocellulose lacquer compounded with a suitable gum and dissolved in a suitable solvent so that it can be made to adhere to the tubes. China Wood oil and linseed oil have also been found suitable for this purpose. Artificial resins such as are commercially formed by chemically uniting formaldehyde and phenol, produce a very desirable substance with which the tubes may be coated.

After the tubes have been coated with any of the substances above referred to, they are dried by means of a current of warm air before being subjected to the next step of the process. This coating thus produces a very superior water resisting coat on the outside of the tube and one which has been found to be much more desirable than the thin coat of oil produced thereon by my former process. When the tubes have been sufficiently dried, they are impregnated with paraffin in a vacuum chamber. This step in the process includes placing the tubes in the vacuum chamber before the introduction of the paraffin therein, exhausting the air from said chamber, and thereafter introducing the paraffin into the chamber to fill the pores of the tubes, to increase the waterproofing qualities thereof. This step of the process is more fully described in my process previously referred to.

The tubes are then passed through a standard process of manufacture ending with the placing of a top wad over the charge placed in the shell and holding said wad in place by crimping the edge of the tube. It has been found that by coating the joint between the top wad and crimped portion with a suitable drying oil such as Perilla oil, that the waterproofing qualities of the tube are increased. I have found that Nitro-cellulose lacquer is also very desirable for this purpose and is the coating which I am using at the present time in carrying out my invention. The coating enters the joint between the top wad and crimped portion so that water will not penetrate this portion of the shell as it might otherwise do. It has been found by tests that tubes produced by this method give far superior results compared to those produced by any of the methods herefore employed. I have experimented with shells produced by the various methods described herein and the results of the tests which I have made are as follows:

In my test using shells waterproofed with paraffin only and using a mineral oil lubricant in the ironing operation and which did not have the crimp waterproofed by a suitable means such as described herein the shells were found to give an immersion test in water of only two hours and five minutes whereas the same tubes with the crimp waterproofed gave an immersion test of three hours, showing that the waterproofing of the crimp added approximately one hour to the water resisting properties of the tube, as measured by certain standards. The immersion test consists of immersing the shell in water and noting the length of time required for them to swell to fit a standard gauge provided for the purpose.

My next test was with shells lubricated in the ironing operation with Perilla oil and impregnated with wax, as described in my previous process, and these shells gave an immersion test time of approximately five hours. The same shells, after adding a crimp lacquer operation, gave an immersing test time of six hours and thirty minutes, thus adding approximately one and one-half hours to the time which the shells would resist the action of the water, again showing the great value of using the step of waterproofing the crimp as well as waterproofing the tube itself.

In the present process, it has been found that shells produced as herein disclosed but without waterproofing the crimped portion give an immersion test of from six to seven hours whereas with the addition of the step of waterproofing the crimped portion, this immersion test was substantially increased to from twelve to twenty-four hours, thus showing the very superior results which are to be obtained by the use of my process. While it may be desirable at times to use shells produced without waterproofing the crimped portion, the best results have been obtained by using the entire process and such process is the one which I prefer to use.

Another result which has been obtained by my process has been the elimination of "cut-off" which is the breaking or cutting off of the shell at the end adjacent the metallic head and is produced by the gases formed when the shell is fired, entering the pores of the paper and so weakening the tube that the pressure causes the paper to be cut off at the edge of the metallic head. Tubes produced by my process are so thoroughly impregnated that the gases cannot enter the pores of the tube and cut-off is eliminated.

A still further result of my improved process is the strengthening of that portion of the tube which has been crimped to hold the top wad in place, thus preventing deformation of the shells when they are roughly handled or when used in an automatic shot gun or pump gun.

Drying oils or semi-drying oils may be used in my process and where the oil dries too slowly for convenience, a suitable dryer, such as previously described, may be employed but some oils will dry sufficiently fast so as not to require the addition of any dryer thereto. For instance, Perilla oil, in some of its grades, which may be purchased in the raw state on the market, has been found to be

satisfactory for use without a dryer, but since a substantial coating of Perilla oil is used in this process after the ironing operation, it is preferable to hasten the drying thereof by a suitable dryer.

The term "drying oil" as used in the claims, is intended to cover semi-drying oils or oils to which a suitable dryer has been added.

Obviously, those skilled in the art may make various changes in the specific method described without departing from the spirit and scope of the invention as defined by the appended claims, and I therefore do not wish to be restricted to the precise embodiments herein contained.

I claim:—

1. The process of treating shot gun shell tubes comprising the steps of ironing the tubes coating the tubes from which the shells are to be formed, with a layer of a drying oil before and after the ironing operation, drying the oil in a current of warm air, loading the tubes with the proper charge, placing a wad over the charge in each of said tubes, crimping the tubes to hold the wads in place, and applying a suitable drying oil to the crimped portions and wads to seal the joints therebetween.

2. The process of treating shot gun shells each having a tubular loaded portion with a wad for holding the load in said tubular portion comprising the steps of coating the tubular portions with Perilla oil, passing the tubular portions through suitable dies, coating the tubular portions thereafter with Perilla oil, impregnating the tubular portions with water-proofing material in a vacuum chamber, and coating the wads with a suitable drying oil.

3. The process of treating shot gun shells each having a tubular loaded portion with a wad for holding the load in said tubular portion comprising the steps of coating the tubular portions with Perilla oil, passing the tubular portions through suitable dies, coating the tubular portions thereafter with Perilla oil, impregnating the tubular portions with water-proofing material in a vacuum chamber, and coating the wads with a suitable cellulose lacquer.

4. The process of treating shot gun shells having tubular loaded portions and wads for holding the loads in said portions comprising the steps of coating the tubular portions with a suitable drying oil, passing the tubular portions through suitable sizing dies, thereafter coating the tubular portions with a suitable drying oil, and coating the wad and adjacent portions of the tubular portions so as to seal the joints between the wads and the tubular portions and to render said wads impervious to moisture.

5. The process of treating shot gun shell tubes comprising the steps of coating the tubes with a suitable drying oil, passing the tubes through suitable dies and thereafter coating said tubes with a layer of drying oil.

In testimony whereof I have signed my name to this specification on this 23d day of January, A. D. 1929.

HARLEY T. PECK.