magazine without putting on leather slippers, which are kept for the purpose.

When men are employed in magazines they should be made, when other circumstances permit, to change their clothes on entering them, to avoid risk from their having matches, &c., in their possession.

Hints on Coopering.

The following *hints on coopering* are introduced, as likely to be useful Powder barrels consist of three parts, viz.:—

1. Staves.
2. Heads.
3. Hoops.

1. Staves.

The most protuberant part of the barrel is known as the "bilge," and the centre of the bilge is distinguished as the "pitch."

Between the bilge and the end of the barrel is the "quarter."

The extreme end is known as the "chime."

To distinguish one end of the barrel from the other, that which is opened (when required) is known as the "top end," the other as the "back end." The top end may be known by having the staves bevelled off close to the chime to facilitate heading.

There are thus also the "top" and "back bilge," the "top" and "back quarter," the "top" and "back chime."

2. Heads.

The heads are known as the "top heads" and "back heads" respectively. When a head is in three parts, the "dowels" having been broken or pulled asunder, the two outside pieces are known as the "cants" or "outsides"; the other part is known as the "middle" piece.

3. Hoops.

Barrels used to be either "full bound" or "quarter bound," according to the number of hoops. All powder barrels, either full or quarter bound, have four copper hoops, the remainder ash. These hoops are situated about the chime and round the bilge of the barrel, and are known as the "copper chime" and "bilge hoops."

On the "full bound" barrel there were also six ash hoops at each end, situated one below the copper bilge hoop; four at the quarters and one above the copper chime hoops.

§ 2553.

Powder barrels are now made with four copper and six ash hoops, each copper bilge hoop has an ash hoop on each side of it, the copper chime hoops have ash hoops outside them. The wood hoops protect the barrel, which would otherwise rest on the bilge, they also keep the copper hoops from slipping.

To unhead a barrel.

A barrel can be unheaded in two ways. The first and more common method is to place the barrel with the top end uppermost, and then to remove the top chime hoops and loosen the top quarter hoops. The left hand is then pressed upon the middle piece of the head, which is struck gently with the adze or mallet close to the chime on the side nearest the cooper, until it is started out of the groove and falls into the barrel.

First method

Second method, or "boxing."

The second method is called "boxing out" the head, and is adopted when the groove is deeper than usual, or when from other causes, such as the barrel being incorrectly made and having too sharp a curve, the head cannot be readily removed by the first method. The hoops are loosened and removed as before, and the left hand placed upon the head, and a few smart blows are struck with the mallet round the pitch of the barrel, by which means the staves are, as it were, sprung back, and the head being thus released falls through.

Heading a barrel-head whole.

To head a barrel.—The head, if whole, is placed with its bevelled edge (on the side away from the cooper) in the groove, the left hand is

then placed upon it, and the head slightly struck, as much as possible in the direction *away* from the workman, with the adze or mallet; in this manner it is driven into the groove all round. The chime hoops are then replaced. If on heading a barrel the head should accidentally be driven a little below the groove, it can generally be jarred back into its place by laying the barrel on its side and tapping the top end of the staves.*

Head in two pieces.

When the head is in two pieces, the dowels (if still adhering) must be cut away. The larger piece is then placed with the whole of the left front in the groove to the left hand side, away from the workman. The small piece is then placed alongside the larger, its further edge also entering the groove; the left hand is then placed over the junction, and by means of a few gentle blows, given with care and at the spots where they may seem to be most required, the head is driven into the groove.

Head in three pieces.

If the head is in three pieces, the dowels must be cut off and the pieces matched according to the lettering on the head. One of the "cants" or "outsides" is then placed as the larger piece in the last case, and supported by the left thumb, which is brought over the side. The middle piece is then placed against it, its further edge in the groove, and its straight edge pressing hard against the side of the "cant." The other cant is then placed in the groove; and proceed as when the head is in two pieces.

Flagging.

Sometimes when the barrel is headed the head will be found to be a little out of round or injured at the edge, thus leaving an opening between the head and staves. It then becomes necessary to use the "flagging tool." One of its teeth is pressed against the inside of the stave where the opening appears, and the other tooth outside the stave to the right. By pressing against the handle, and using it as a lever, the opening is widened, and a little "Dutch rush" or "flag" (if not procurable, paper or rag will serve) is placed inside the gap; the flagging tool is then removed, and the stave being released springs back into its place, pinching in the rush against the head.

To avoid using a knife (*which should never be allowed to enter a magazine*) the rush should be placed as much as possible flush with the top of the head of the barrel.

To alter the size of a hoop.

If the ash hoops are too large they may be reduced in diameter to the required size by placing a small three-sided prism or wedge of wood, called a "Dutchman," between the shoulders or notches of the hoop. If the hoop is too small, it may be enlarged by cutting away part of the shoulders.

Taking to pieces or "shaking" a barrel for stowage.

Before taking a barrel to pieces for stowage (called "shaking" a barrel) the staves must be numbered round the inside with a piece of chalk or a pointed tool.† The hoops are then removed and laid aside. The ash hoops (if the barrel is to be sent away) are seldom packed with it; the copper hoops are doubled up. The head is divided into two or three pieces by pulling open the joints without breaking the dowels.

The staves are then packed round the copper hoops and the "ends," and the pack secured with twine or with some of the wooden hoops.

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* It is forbidden to use nails in re-heading a barrel; sometimes copper nails have been used, but these are objectionable even when the barrel is empty, as in unheading they are apt to get into the barrel and so find their way to the powder when the barrel is refilled.

† This need only be done with hand-made barrels; with machine-made barrels it is not necessary.

To put a barrel together.

To put the barrel together again the pack is untied and the copper hoops unbent. One of the copper chime hoops is then taken in the left hand and held at about the height of the barrel from the ground, the cooper kneeling on his right knee. The staves, as numbered, and with their top ends uppermost, are then arranged round the inside of the hoop, their lower ends resting upon the ground, the first few staves as they are arranged being supported by the outside of the left leg and left foot. In this manner the barrel may be built up, when the upper bilge hoop is slipped on. The barrel is then turned round and the other bilge hoop slipped on. The head is then put together and the back head is placed into the barrel (working chiefly from the inside); the back chime hoop is then placed on. The barrel is then headed up, the top chime hoop being previously removed to admit of this being done; the chime hoop is then put on again.

To remove a stave without "shaking" the barrel down.

All the hoops, except the bottom chime hoop and the top bilge hoop, must be removed; remove the required stave and replace it by another, and then replace the hoops.

Heading and unheading vats.

The heads of vats (chiefly used for the conveyance of clothing, harness, &c.) are secured by means of two hoops nailed round the inside of the chime of the vat, the head being between them.

To unhead a vat thus secured the "outside lining hoop" (as the hoop above the head is called) must be removed, and this is done by "prising" out the nails with a chisel or lever of any convenient sort, commencing at the "lap" of the hoop.

To head the vat.—The head is laid upon the inside lining hoop, and the outside lining hoop is nailed over it.