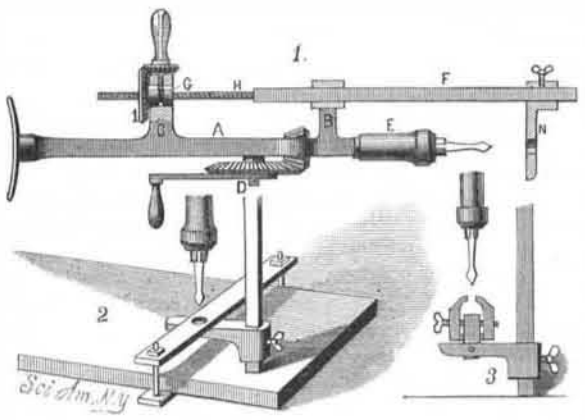
IMPROVED BREAST DRILL.

The drill stock, A, is provided with arms, C B, on the side opposite the crank gear, D, which drives the spindle of the chuck. A strong bar, F, slides in one arm, and its upper end, which is screw threaded, fits in a feed nut, G, in the other arm. On one end of the nut is a toothed wheel that gears with a beveled pinion attached to a thumb bit fitted on a stud projecting from the end of the bracket; by turning the thumb bit the bar can be drawn along the drill chuck, E. The lower end of the bar carries a bracket, N, that serves for a work table, the work being placed on it and forced against the drill by the feed nut, which is turned by the left hand of the operator, who turns the crank gear with the right hand.

When the piece of work is large and heavy, the drill may



HARDISTY'S IMPROVED BREAST DRILL.

be clamped to it by bars, as clearly shown in Fig. 2, or a vise may be secured to the bracket, N, as in Fig. 3, for holding the work by that means. This bracket is fitted to the bar with a binding screw so as to be shifted according to the size of the piece to be drilled. The baris fitted parallel to the stock, so that the bore will be true when the work is placed squarely on the face of the bracket.

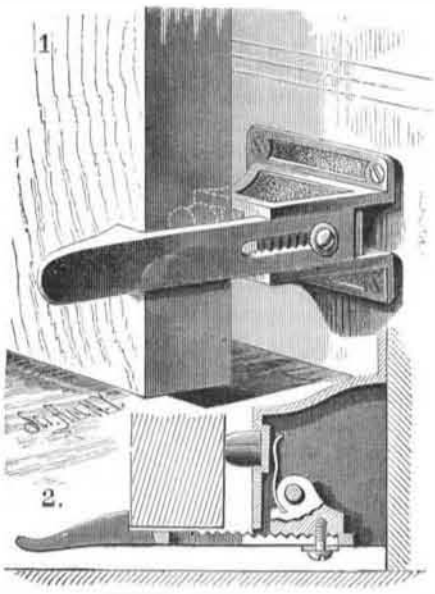
This invention has been patented by Mr. J. F. Hardisty, of St. Joseph, Mo.

New Bone Bleaching Process.

Various chemicals have been used for the purpose of bleaching bones, such as sulphurous acid, chloride of lime, and latterly peroxide of hydrogen; but according to experiments made at the Bavarian Museum of Arts, a very simple and effective method has been discovered, which is said to impart to bones thus treated almost the same appearance as ivory. After digesting the bones with ether or benzine, to remove the fat, they are thoroughly dried and immersed in a solution of phosphorous acid in water containing 1 per cent of phosphoric anhydride. After a few hours they are removed from the solution, washed in water, and dried, when they will appear as indicated above.

NOVEL DOOR CHECK.

The door catch herewith shown automatically engages with the door to hold it open, and can be readily released by a slight pressure with the foot. An ornamental box or case is secured at its back to the base board of the room in such a position that the device will come within range of either the bottom or upright edge of the door. A hook catch, having its rear portion serrated so as to engage with a carrier similarly constructed—shown in the sectional



RALL'S DOOR CHECK.

drawing, Fig. 2—projects from the casing. The catch and carrier are held in engagement by a screw passing through a slot, in the shank of the catch, to provide for the adjustment of the catch to suit doors of different thicknesses. A spring keeps the catch in contact with the door. Projecting from the front of the case is a stop made of some elastic substance which prevents the knob of the door from striking the wall.

This invention has been patented by Messrs. L., G. and E. Rall, and additional particulars may be obtained from M. Lehmann and Rall Bros., of Glasgow, Mo.

Properties of Brass.

The most important properties of brass compared with copper are the following: The color of brass is much brighter, and more approaching to that of gold; it is more fusible than copper, less subject to rust and to be acted upon by the vast variety of substances which corrode copper with so much ease; and it is equally malleable when cold, and more extensible than either copper or iron, and hence is well fitted for fine wire. Brass, however, is only malleable when cold. Hammering is found to give a magnetic quality to brass, and this circumstance makes it necessary to employ unhammered brass for compass boxes and similar apparatus.

The expansion of brass has been very accurately determined, as this metal is most commonly used for mathematical and astronomical instruments, where the utmost precision is required. Mr. Smeaton found that 12 inches in length of cast brass, at 32°, expanded by 180° of heat (or the interval from freezing to boiling water) 0·0225 part of an inch.

Brass wire under the same circumstances expanded 232 parts; an alloy of 16 of brass with 1 of tin expanded 229 parts. The expansion of hammered copper is only 204 such parts, but that of zinc is 253, so that brass holds a middle place in this respect between its two component metals.

Most of the zinc readily burns off from brass when kept melted in a strong heat with free access of air. When the heat is equal to that of melted copper, the zinc takes fire and slowly burns away. At last, little else but copper remains, but still united with a small portion of zinc, which no further continuance of the fire will entirely separate.

Some kinds of very fine brass are said not to be made by cementation, but by a more speedy and direct union of copper and zinc, care being taken to prevent the access of air to the materials while in fusion. Very fine brass may also be made by mixing together the oxides of copper and zinc and reducing them with a carbonaceous flux. Sage gives the following experiment to this purpose: Mix together 50 grains of the oxide of copper, remaining after the distillation of verdigris (which is very pure), with 100 grains of lapis calaminaris, 400 grains of black flux, and 30 grains of charcoal powder; melt the mixture in a crucible till the blue flame is seen no longer round the lid of the crucible, and when cold a fine button of brass is found beneath the scoria, weighing a sixth more than the copper alone, obtainable from its oxide in the same way, but without the calamine. This brass has a very fine color, like gold.

On this experiment M. Sage observes that there appears to be a point of mutual saturation between the two metals, which is when the copper retains one-sixth of zinc, and this portion it will retain however long it is heated, provided the surface of the melted metal be covered to protect the zinc from the action of the air; but if the brass contains a greater proportion of zinc, precisely this excess will escape, even in covered vessels, and will burn when it comes out to the air.

The same chemist also observes that the color is the finest at the above proportion. These experiments seem to require further confirmation, but we may reckon that to be the most perfect brass which is composed of about 14·28 per cent of zinc and 85·72 of copper, and which is not liable to any alteration in its constituent parts by successive or long continued fusions, provided the access of air be prevented.

Analysis shows a vast variety in the proportions of the different species of brass used in commerce. In general the extremes of the highest and lowest proportions of zinc are from 12 to 25 per cent of the brass. Even with so much as 25 per cent of zinc, brass, if well manufactured, is perfectly malleable, though zinc itself scarcely yields to the hammer. M. Dize analyzed a specimen of remarkably fine brass made at Geneva, for the purpose of escapement wheels and the nicer parts of watch making, the perfect bars of which bear a very high price. This metal unites great beauty of color to a very superior degree of ductility. It was found to consist of 75 of copper with 25 of zinc, and probably, too, the copper was Swedish, or some of the finer sorts. The common brass of Paris seems to contain about 13 per cent of zinc, the English probably more.

Brass is applicable to an infinite variety of purposes, is easily wrought by casting and hammering, and by the lathe, its wire is eminently useful, and it takes a high and very beautiful polish. The appearance of brass is given to other metals, by washing them with a yellow lacquer or varnish, a substitution often very much to the detriment of the manufactured article.—*Glassware Reporter.*

A Preventive of Stopped Ascension Pipes.

The manager of the gas works at Deventer, Holland, has adopted, for preventing stoppages in his ascension pipes, an exceedingly simple arrangement, which is described in the *Organe Industriel de l'Eclairage.* The system consists in the insertion in the mouthpiece end of the retort, immediately after charging, of a sheet of iron fitting the retort as closely as possible. This piece of sheet iron has in the middle a hole equal in area to the ascension pipe. The tarry vapors, heavy oils, and carbon dust are for the greater part arrested by this plate, and are thereby prevented from rising a few feet higher, and condensing on the interior surface of the ascension pipe. The office of the plate is simply to arrest as far as possible the matters that in the ordinary way settle at the lower end of the ascension pipe.

FOLDING STEP LADDER.

The invention shown in the annexed cut was recently patented by Mr. George A. Sommer, of 265 Greene Avenue, Brooklyn, N. Y. The side boards, steps, landing, and standard are of the usual form, except that the side bars of the latter are pivoted to the side boards near the landing. To the upper ends of these bars are pivoted the ends of side rails, whose lower ends are pivoted to links joined to the side boards near their lower ends. When the standard is closed against

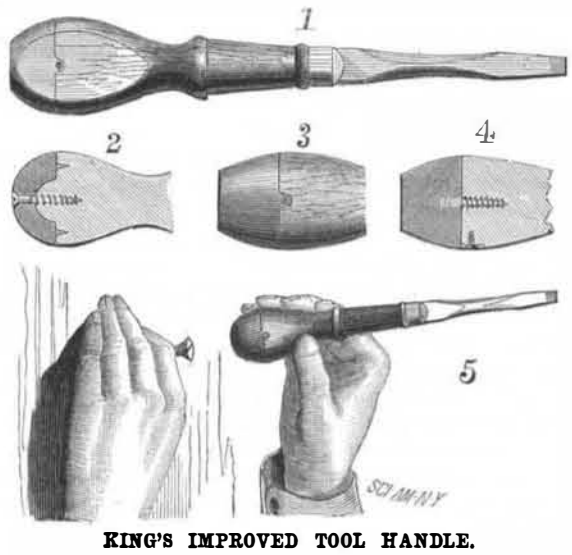
SOMMER'S FOLDING STEP LADDER.

the back of the ladder, the rails are folded down along the side boards; when the lower part of the standard is moved away from the ladder, the rails are extended along the front so as to assist a person to ascend and descend the ladder. The rear edges of the side boards are provided with notched braces that prevent the standard from being swung out too far and that hold the ladder in open position for use. The braces come into position automatically, requiring no attention on the part of the one using the ladder.

AN IMPROVED TOOL HANDLE.

The annexed engravings show a useful improvement that can be applied to the handles of many kinds of tools, and for which letters patent were recently granted to Mr. John A. King, of 2,015 Chestnut Street, St. Louis, Mo. The wooden portion of the handle is provided with a metal cap secured in position in any suitable manner. In the construction shown in Fig. 2, the cap has a recess for receiving a projection on the wooden portion of the handle; it is held on by a screw, and is steadied by pins entering the wood. In Figs. 3 and 4 the screw is made a part of the cap, and turning is prevented by a thin lug on the cap entering a recess in the wood, and being held in place by a screw. The handle may be made with flattened sides as shown in Fig. 1, or with a globular end as in Fig. 5, the form being governed by the work to be done with the tool.

This plan not only increases the durability of the tool by strengthening that part which is subjected to rough usage, but permits the tool to be used for purposes for which it would not otherwise be adapted. In ordinary work the starting of a screw takes time; the change from the screw driver to the hammer and back again having to be gone through with before the turning is begun. In this case all the time consumed is in the turning of the tool end for end, as indicated in Fig. 5. The metal cap perfectly protects the wooden handle.



KING'S IMPROVED TOOL HANDLE.

The various applications of this improvement will be readily perceived by those who have felt the want of such a device.

SALTING WALKS.—The best way, says a correspondent, to apply salt to paths, to destroy weeds, is as follows: Boil the salt in water, 1 pound to 1 gallon, and apply the mixture boiling hot with a watering pot that has a spreading rose; this will keep weeds and worms away for two or three years. Put 1 pound to the square yard the first year; afterward a weaker solution may be applied when required.