string; thus, if the bead is in the centre of the cord, the drawing will be double the size of the original. The best results are only obtainable after some practice, and by employing a finer point than a bead.

EBONY.—Of this wood there are several varieties in the market, the only one serviceable to the carver being one with a close and even grain, so close, indeed, that under the gouge it appears to have no fibre whatever. The hardness renders it extremely difficult to work, and for this reason ebony carvings are of great value. The great defect which this wood has, is its tendency to exfoliate, and to split. An imitation ebony is sometimes offered, which is made by soaking pear-wood in an iron and tanning dye-beck for a week or more. The colour penetrates to the very heart of the wood, so that the cut is as black as ebony.—*English Mechanic.*

PROTECTION OF WOOD CARVINGS.—Worm-eaten wood may be saved from further ravages by fumigating it with benzine, whereby the worm is destroyed. Another way is to saturate the wood with a strong solution of corrosive sublimate—a process which may be advantageously employed to protect carvings in wood. But as sublimate destroys its color, it will be necessary to restore the latter by ammonia, and then by a very dilute solution of hydrochloric acid. The holes made by the worm may then be injected with gum and gelatine; and a varnish of resin, dissolved in spirits of wine, should afterwards be applied to the surface.

A SATINWOOD STAIN FOR THE INSIDE OF DRAWERS.—Take 1 quart of alcohol, 3 ozs. of ground turmeric, 1½ ozs. of powdered gamboge. When this mixture has been steeped to its full strength, strain through fine muslin. It is then ready for use. Apply with a piece of fine sponge, giving the work two coats. When it is dry, sand-paper down very fine. It is then ready for varnish or French polish, and makes an excellent imitation of the most beautiful satinwood.

A CHEAP BLACK STAIN FOR PINE OR WHITEWOOD. — Take 1 gallon of water, 1 lb. of logwood chips, ½ lb. of black copperas, ½ lb. of extract of logwood, ½ lb. of indigo blue, and 2 ozs. of lampblack. Put these into an iron pot and boil them over a slow fire. When the mixture is cool, strain it through a cloth, and add ¼ oz. of nut-gall. It is then ready for use. This is a very good black for all kinds of cheap work.

TO STAIN BOX-WOOD BROWN.—Hold your work to the fire that it may receive a gentle warmth, then take aquafortis, and with a feather or brush, pass over the work till you find it change to a fine brown (always keeping it near the fire); you may then oil and polish it.

A CRIMSON SPIRIT STAIN.—Take 1 quart of alcohol, 3 ozs. of Brazil-wood, ½ oz. of dragon's-blood, ½ oz. of cochineal, and 1 oz. of saffron. Steep to full strength and strain. It is a beautiful stain for violins and other wooden musical instruments, work-boxes, and fancy articles.

A POLISH FOR REMOVING STAINS, &C., FROM FURNITURE.—Take ½ pint of alcohol, ¼ oz. pulverized resin, ¼ oz. gum shellac, ½ pint boiled linseed oil. Shake the mixture well and apply with a sponge, brush, or cotton flannel, rubbing well after the application.

TRANSPARENT GUM.—A little glycerine added to gum or glue is a great improvement, as it prevents the gum or glue becoming brittle. It also prevents gummed labels from having a tendency to curl up when being written on.

PAINT STAINS ON GLASS. — American potash, 3 parts; unslaked lime, 1 part. Lay this on with a stick, letting it remain for some time, and it will remove either tar or paint.

CLEANING CARVED WOOD.—The feather end of an old quill pen will, by the aid of benzoline, effectually remove the dirt from the interstices of carvings.

ORNAMENTAL WORK ON ENGINES.—The movement to replace the brass ornamental work on engines with plain black finish has progressed very rapidly within a few years, effecting a saving which in the aggregate must be very considerable. It is true that an engine presenting to view an unrelieved black from pilot to tender does not have that splendor of appearance given by highly colored brass and brilliant gilding and striping, but it seems to draw just as well, and the road does not show any falling off of passengers or freight on account of the plainer finish.

NEW SYSTEM OF DRAW-BRIDGE.

The engraving on the opposite page we take from the *Manufacturer and Builder*. It represents another of the applications which may be made of the system of moving loads by simple hydraulic pressure, as invented by Mr. William Burdon, Brooklyn, N. Y.

The system here represented is especially intended for canals of limited width, and where it is desired not to encumber the shores or the approaches with machinery. The bridge is operated by simply turning a wheel, as seen at the right hand side of the engraving; this wheel admits water to a horizontal cylinder containing a piston, which, when the water is admitted, exerts a pull proportionately to its surface and the pressure of the head of water. In order not to oblige this pressure to lift more than the full weight of the draw, owing to the oblique direction of the pull, the following ingenious arrangement has been devised, by which not only the bridge is partly balanced, but the labor of the hydraulic lift is reduced to raising less than one-fourth of the weight of the bridge.

At the extremities of the piers wrought iron hollow columns are erected, in which weights to counterpoise the bridge move up and down. The peculiar arrangements of these weights is one of the special merits of Mr. Burdon's invention. The weights are suspended by chains, which run over pulleys at the top of the columns. The weights in the columns at the left, which are about 20 feet high, counterbalance ¼ of the bridge when it is in its horizontal position, when each pier carries half the weight of the bridge. The weights in the columns at the right side, of which there are two sets, counterbalance more than half the bridge, while the remaining quarter, which, however, by increasing the counterpoises, may be made considerably less than a quarter, is carried by the hydraulic lift. It is clear that as soon as the bridge is raised on one end the strain of the lift on the upper end becomes less, and that in the lower or pivoted end becomes greater, so that when it has attained an incline corresponding with an angle of about 40° with the horizon, it will only have to lift an amount of weight proportionate to the cosine of 40°, which is ¾; at this position the weights in the short left columns, which balance ¼ of the bridge, have reached the ground.

Our engraving represents the bridge in that position. Now the lower weights in the other right-hand columns, which balance another fourth part, assist in the further raising, until it has reached an angle of 60°. The cosine of this angle being ½ of the radius, it indicates that only ½ of the weight is left to be supported. The length of the chains supporting the lower weights in these long columns is so arranged that they then touch the ground. The upper weights still balance more than half of what there is left in the resistance, and they continue the work until the bridge has reached an angle of 75°, the cosine of which is ¼, which shows that only ¼ of the weight is to be lifted; at this point the last mentioned weights will in their turn touch the ground; and then at the last part of its course the hydraulic pressure, which thus was aided by the weights acting as a counterpoise, does the work alone, and brings the bridge in the erect position as indicated by the dotted lines in the engraving.

To lower the bridge the water supply is turned off, and the water before the piston allowed to escape gradually, when, just as gradually, the bridge will descend by its own weight; when it again reaches an incline of 75° and 60° the weights in the high columns will assist in counteracting its strain on the hydraulic piston; when it reaches 40° the weights in the short column will do the same, so that the bridge will come down easily and gradually, while the hydraulic cylinder or piston will never have to do more than lift ¼ of the bridge, or even less, if the weights and chains are arranged accordingly.

The greatest advantage is perhaps that this bridge can be raised and lowered very rapidly, which is of some importance at points where there is much traffic by vessels in the canal as well as by vehicles and foot passengers over the bridge.

IRON BUGGIES.—The introduction of iron buggies is now proposed. An inventor has constructed a vehicle which consists exclusively of iron and steel. For instance, in place of hickory spokes and oak felloes, he employs wrought-iron tubes and T iron; these tubes fit into the axle box at one end, and are riveted to the T iron at the other. The first noticeable effect of the employment of iron for all parts, it is said, has been to add to the weight of the vehicle, this having accrued in spite of the thinness of the parts. The cost also has been enhanced, but for this the augmented strength and durability are regarded as a full equivalent. In appearance it is neat and light.