

## BOY MECHANICS.

(From the "Boston Journal of Commerce.")



BOYS precede men and apprentices precede journeymen. The boy is the father of the man. It is an old saying and a true one. Almost all boys are naturally mechanics. The constructive and imitative faculties are developed, in part, at a very early age. All boys are not capable of being developed into good, practical, working mechanics, but most of them show their bent that way. There are a few cases in which the boy has no competent idea of the production of a fabricated result from inorganic material, but such cases are rare. Given the proper encouragement and the means, and many boys whose mechanical aptness is allowed to run to waste, or is diverted from its natural course, would become good workmen, useful, producing members of the industrial community. Boys are always planning, contriving, and fabricating. Give a boy a good pocket knife, and, unless the trader is uppermost in his nature, he will use it instead of swapping it, and with its aid he will begin construction, the making of something useful, ornamental or attractive out of handy material. With this comprehensive tool he will do, in his crude way, what the experienced mechanic does with his planes, chisels, gouges, augurs, bits, &c., and be a shipwright, cabinet worker, joiner, carpenter and toymaker in one, and sometimes he will turn out specimens of work that the accomplished mechanic need not blush to own.

There are sold, all over the country miniature chests of wood-working tools ostensibly adapted to the hands of the boy mechanic. But in most cases these are play tools in another sense than that they are of diminutive size. The old notion that "anything is good enough for a boy," or "any worn-out tool is good enough for the apprentice" has not lost its force, and these beginners in art and neophytes in work are furnished with miserable apologies for tools that could not keep a place, after a single trial, on the bench of a workman. Such nonsense is reprehensible in theory and wicked in practice. Give your boy and your apprentice good tools and good materials. It is enough for the workman that he can do better work with his years of experience and his ripened judgment, without imposing upon the boy and apprentice with inefficient tools and improper material.

The mechanical boy ought to have a shop of his own. Let it be the attic, or an unused room, or a place in the barn or the woodshed. Give him a place and tools. Let him have a good pocket-knife, gimlets, chisels, gouges, planes, cutting nippers, saws, a foot rule, and material to work. Let the boy have a chance. If he is a mechanic it will come out, and he will do himself credit. If he fails he is to follow some calling that does not demand mechanical skill.

With a foot rule in his pocket the boy will be continually measuring. Before he is aware of it his eye has been educated to judge of dimensions and proportions. It is a good substratum on which to erect the knowledge of practical mechanics. Acquired as an amusement, this knowledge will become practically useful as the boy develops into the man. The employments suggested by the pocket-knife and rule will occupy many an otherwise idle hour, and afford a pleasant relief to the routine of school study and the weariness of oft-played games. The boy will become acquainted practically with substances and be interested in the mechanical operations he witnesses, and this will pave the way for his easy entrance on the vast field of useful endeavour before him. He will become an intelligent and willing apprentice, and a judicious and skilful workman.

## ORNAMENTAL TURNERY.

(CUP AND COVER IN BLACKWOOD AND IVORY.)

(For Illustration see *Lithograph Supplement.*)

THE illustration accompanying this issue shows the object mentioned in our first issue. The photograph shows the form of the cup as a whole, and the details may be examined critically. We are indebted to General Clarke for the subjoined explanation of the details and process of manufacture; but for the benefit of those desiring even more minute particulars we give a few dimensions, taken from the object itself.

The total height from base to finial is  $10\frac{1}{2}$  inches, the photograph therefore is as nearly as possible two-thirds of the actual size. The base is  $\frac{3}{4}$  inch thick and  $3\frac{1}{2}$  inches across the hexagon. The ivory disc lying on the hexagonal base is nearly  $3\frac{1}{4}$  inches in diameter, and barely  $\frac{1}{4}$  inch thick. The blackwood piece with its rounded edge fluted is  $2\frac{1}{2}$  inches in diameter and  $\frac{1}{2}$  inch thick; it has fifty flutes. The ivory ring with the beaded edge is  $1\frac{1}{8}$  inch diameter and  $\frac{1}{8}$  inch thick. The stem to the next ivory ring is  $\frac{3}{4}$  inch long, the ring is  $\frac{1}{8}$  inch thick, and from it to the blackwood ring just below the cup is  $1\frac{1}{4}$  inch. The perforated ivory piece is 1 inch in diameter at the largest part; the perforations have six leaves. The ivory ornament supporting the cup has twenty-four leaves, produced by drilling out the interstices; the extreme diameter at the points of the leaves is  $1\frac{1}{8}$  inch. The cup part is  $3\frac{1}{4}$  inches diameter; it has twenty-four flutes. The ivory ring around it is  $3\frac{1}{4}$  inches diameter. The largest part—that is, the ivory-leaved ring—is  $4\frac{1}{2}$  inches diameter; it has forty-eight leaves; from the tips of these leaves to the base is  $6\frac{1}{4}$  inches.

The cover itself is  $3\frac{1}{2}$  inches diameter at the base, which is an ivory ring shown just above the large-leaved ring. The fluted round-edged blackwood piece above it is  $\frac{3}{8}$  inch high; it has forty-eight flutes. The beaded ivory ring above is  $1\frac{1}{4}$  inch diameter. To the ivory washer with a serrated edge is  $\frac{3}{4}$  inch. The ivory ornament above has six leaves, formed by drilling, and the interstices from the washer to the tops of the leaves is  $1\frac{1}{4}$  inch. The serrated washer is  $\frac{1}{8}$  inch in diameter. The various pieces that compose the article are fitted together and fixed with screws cut in the material itself. The following particulars will enable even the merest tyro to set about making a similar object to that illustrated:—

I have been requested by the Editor to give some explanation of the details of the cup represented in the photograph, for the benefit of such readers as may not be acquainted with the use of the various instruments employed in ornamental turning.

To begin with the base or foot of the cup, which is hexagonal:—A disc of wood, slightly exceeding in diameter the distance from one point to the opposite one of the hexagon, being reduced to the thickness of the intended base—made true and flat on both sides, and polished on what was to be the upper surface—had a hollow screw formed on that side to receive a corresponding portion of the ivory disc, with beaded edge, which lies upon it. The wooden disc was then attached by that screw to a chuck of less diameter than the distance from one flat side of the hexagon to the opposite side, and the six flat sides were cut, in succession, by means of the eccentric cutting-frame carrying a round-ended tool, set to such a degree of eccentricity as would cause the circle it described in revolving to be somewhat larger in diameter than the length of one of the sides of the intended hexagon. The mandrel, with

the chuck carrying the disc of wood, being held by the index in the division plate, the revolving eccentric cutter was drawn—by a handle on the slide-rest screw—past the edge of the disc, carrying away a small portion of its material, and thus planing, as it were, a flat surface. This operation was repeated, taking off a little more of the wood each time, until the flat surface was supposed to be nearly at the proper depth; then, shifting the mandrel round one-sixth of the circle for each of the remaining sides, they were cut in the same manner, and each side was cut a little deeper until they met one another. To avoid tool marks, it is as well to finish each side with a light cut, after sharpening the tool afresh. To save wear and tear of the tool, a portion of each side may be removed by the saw before beginning the work with the cutter.

The ivory disc, with its edge cut into beads, requires no explanation. It screws into the wooden base, and has a hollow screw in it to receive the next portion of blackwood, which has its rounded edge cut into flutes. These were produced by means of the dome chuck and eccentric chuck combined. The dome chuck was so placed on the eccentric chuck that its length lay at right angles to the slide of the latter, and then such an amount of eccentricity was given the slide as caused the edge of the wood, mounted on a chuck and placed on the dome chuck, to describe a portion of a small circle when the mandrel was moved round by hand. The flutes were cut with a  $\Lambda$  shaped tool in the universal cutting-frame, set to cut vertically upwards.

The perforated piece of ivory, showing a portion of the blackwood stem through its openings, having been chucked by a screw at its large end, was shaped externally and polished, and bored throughout its length with a hole large enough to admit the stem. A tool, filed up out of a piece of flat steel, being inserted into the hole, was worked about until the interior of the orifice was about parallel with the exterior, and the ivory was reduced to a thin shell, coming to a sharp edge at the bottom. The perforations were made with drills of various diameters.

The lower portion of the cup itself was fluted on the dome chuck with broad flutes, produced by a round-ended tool in the universal cutter, cutting horizontally, while the mandrel, carrying the dome chuck, was moved slowly round by hand for each flute. The next piece of blackwood, with parallel sides, has a corresponding number of flutes, executed with the same cutter, set to cut vertically, and drawn past the edge of the wood by the handle on the slide-rest screw, the wood being in the usual position on the mandrel, without employing the dome chuck.

The ivory ring, with projecting pointed leaves, which forms the top of the cup, was shaped, partly by the eccentric cutting frame, and partly by the drill. The tool in the eccentric cutter cut the edge of the ivory, which had been reduced almost to a knife-edge, into scollops, just meeting one another to form the points of the leaves. Then, with the same divisions of the division plate, a drill cutting at the sides, was carried horizontally towards the centre of the work for about a quarter of an inch, and then a larger drill at the inner end of the opening finished the cut.

The cover of the cup has at the bottom a flat ivory ring, which just fits into a circular recess in the upper rim of the cup. Into this is screwed the dome-shaped piece of blackwood, fluted on the dome chuck by a  $\Lambda$  shaped tool in the universal cutter, set to cut vertically upwards. The next piece of

wood is simply turned and polished, and the one next above it, with a little ivory washer between them, with beaded edge, might as well be also simple turned to shape and polished, though in the original it has fluted sides, cut, if I recollect rightly, with the assistance of what is called the "curvilinear apparatus," in which a template, filed to the required form of outline, serves as a guide to the path of the cutter.

The small cone of ivory with flat sides, which forms the summit of the cover, after being roughly turned to conical shape, had its sides cut with a flat-ended drill, cutting on its left side, drawn while revolving, by a handle on the slide-rest screw, from the point towards the base of the cone, the slide-rest being set at the necessary angle.

The various parts of this cup and of the cover are, of course, attached to one another by screws, and, the stem being somewhat slender, it is as well to strengthen it by a rod of steel wire throughout its length, with a small brass nut at each end, which can be sunk in recesses in the wood.—G. C. C.

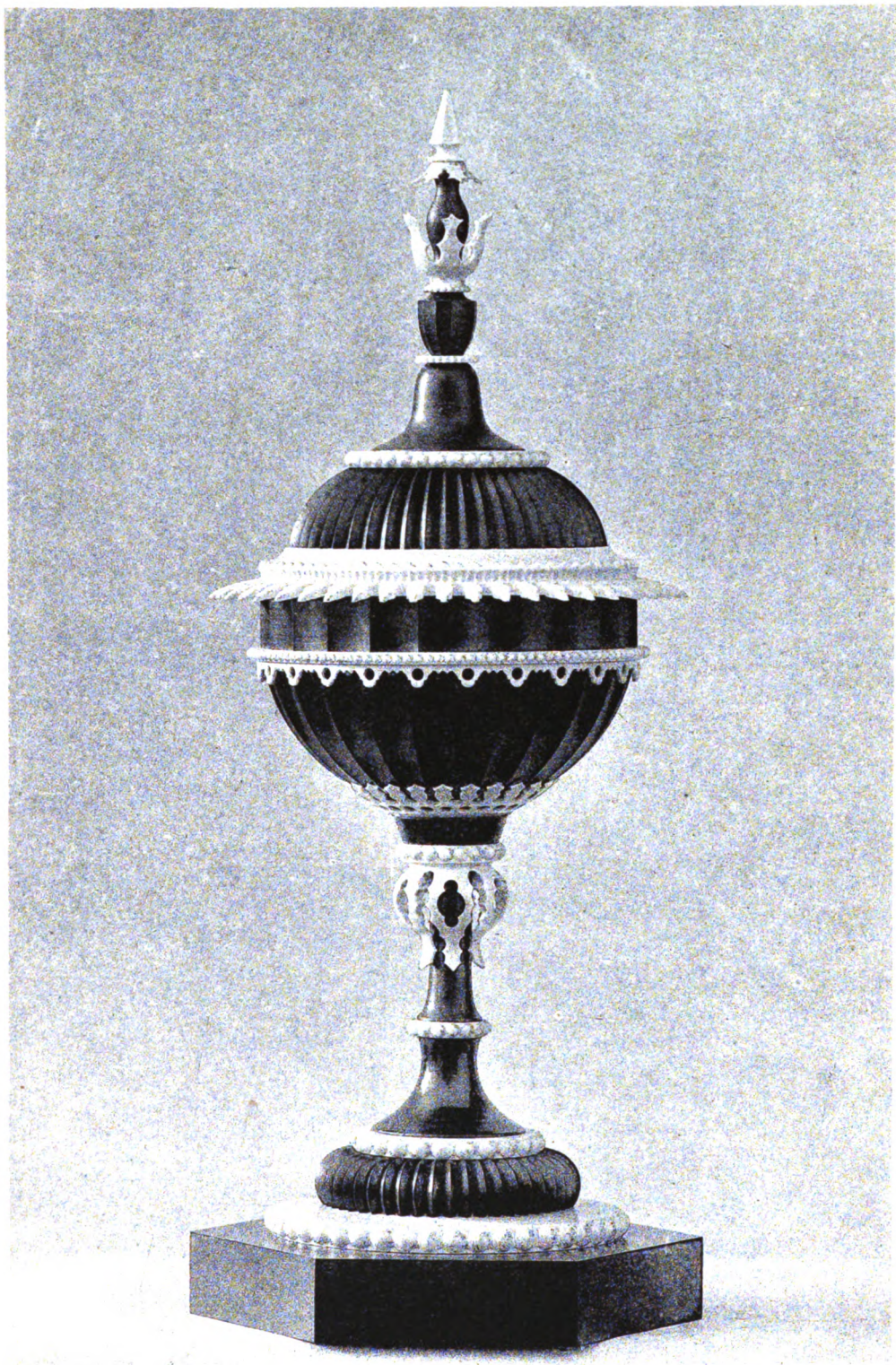
We have only to again express our thanks to G. C. C. for his kindness in lending the object and furnishing the above description. We also are pleased to say that the loan of several other specimens of ornamental turnery, executed by the same facile hand, has been offered and gladly accepted, so that our readers may anticipate a specimen of ornamental turnery to accompany our forthcoming issues. Should any other possessors of interesting specimens be disposed to allow of their being photographed, we shall be glad to have an early intimation.



**Home Made Emery Wheels.**—The manufacturers of solid emery wheels fill a large gap in the demands of the manipulations of metals. But there are cases where certain forms of abrading surfaces must be maintained in order to give proper results. In these cases there is no outside help for the manufacturer, but he must construct his own wheels. If this is not really exacted, yet it is believed to be cheaper to form and dress wheels for certain purposes than to depend upon manufacturers of solid wheels. In some instances it is required that the wheel shall be of some determinate diameter, impossible to be preserved in a wheel that wears gradually away and gradually is reduced in diameter. Ordinary glue is the matrix generally employed to hold the particles of the cutting emery in place; but sometimes this is not tenacious enough, or rather it fixes the particles to the periphery without holding them. Where V scores or U scores are required on the face of a wheel, it is found that when glue alone is employed it retains the particles of the coarser grades of emery only by a portion of their surfaces, and that these particles fly off before they have performed any large amount of work. A means of imbedding these particles firmly is found in the mixture of a certain portion of hydrate of lime—plaster of Paris—with the melted glue. The mixture should be not only plastic, but almost fluid, and plaster should be added just before using the glue on the wheel, and the glue and plaster should be hot and the surface of the wheel wet. When rolled in the emery the wheel should be pressed down with as much force as can be applied by the hands on the rod through the wheel centre, and the rolling should be continued as long as the emery will adhere. The proportion of plaster is just sufficient to reduce the liquid glue to a viscid or semi-fluid state; its only use is to give body to the glue and assist in holding the emery in place.



AMATEUR MECHANICS.



ORNAMENTAL TURNERY.— CUP IN BLACK WOOD & IVORY.