SOME NEW AND USEFUL ELECTRIC HAND TOOLS.

BY A. FREDERICK COLLINS.

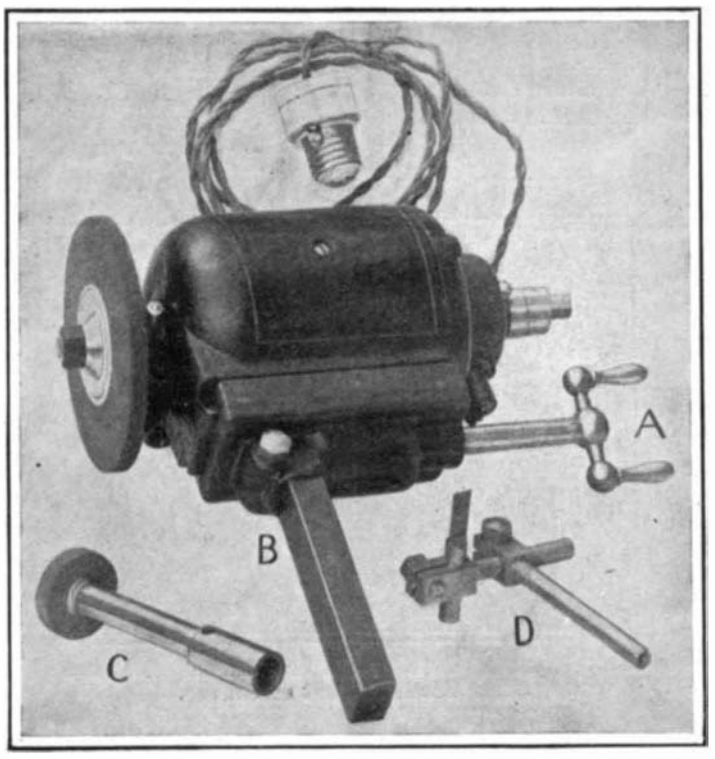
It is generally acknowledged abroad, according to Consul J. I. Brittian, of Kehl, Germany, that the Americans excel their foreign competitors in the manufacture of machine tools, due chiefly to their thorough knowledge of the industry and their aptness in meeting every possible requirement.

The above statement is fittingly justified by a new branch of the business, namely, that of building portable hand tools driven by electricity. There are several companies in the United States that have given special attention to the manufacture of these devices, some of which are illustrated on this page.

One company's latest development along this line includes an electrically driven bench drill suitable for small works, a portable electric breast drill and an electric buffing and grinding outfit for household use. The bench drill has been especially designed for the use of jewelers, chauffeurs, repair men, and manufacturers who have a large amount of drilling on small work and in other places where the drilling service is not too heavy and severe.

Machine and general repair shop men, as well as manufacturers, are becoming better informed and more convinced of the advantages of the electric motor for driving their machinery, and realize that the saving of both time and money are possible in just those operations for which the electric bench drill is designed. The bench drill shown herewith is furnished with a vertical motor mounted on top of a column sliding in a socket cast integrally with the base, in which it can be adjusted for various heights. The motor body or head is also adjusted radially for drilling positions.

The whole outfit rests on a broad base 6 x 10 inches which gives it the necessary stability. The minimum height is 16 inches when the motor arm is in the lowest position and the maximum height is 22 inches when the arm is fully raised, thus giving a range of 6 inches through which the motor body may be raised or lowered. The work is fed to the drill by raising the circular table, which is operated by a lever within a range of 1¼ inches vertically. The motor is series wound and can be supplied with 115 or 230 volt winding, for use on direct-current circuit only. A single gear reduction is provided between the armature shaft and drill spindle. The hand wheel mounted on the armature shaft at the top is convenient for turning the spindle and adds a flywheel effect to the spindle as well, giving a smooth and steady rotation to the drill. The amount of power required for the operation of the drill naturally varies with the work performed, but in no case is it excessive. The largest drill the chuck will hold is 21/64 inch in diameter and from this all sizes down to No. 40. The bearings are provided with self-oiling cups which require attention only every three or four months. The outfit includes a chuck of standard design, ten feet of attaching cord and an Edison plug.



Electrical Tool-Post Grinder.

The weight of the bench drill complete is about 40 pounds, enough to insure firmness and rigidity.

The new domestic grinding and buffing outfit illustrated has been put on the market especially for grinding knives, scissors, and other small edged tools, and for polishing silverware, jewelry, and other like articles. A grinding wheel of suitable character to insure a smooth cutting edge without the use of a sharpening tool is interchangeable with the buffing wheel. These outfits are adapted for the intermittent service required in the ordinary household but are not suitable for the heavier continuous work required by jewelers and dentists.

The household outfit consists of a motor with shaft extending two inches from the end of the bearing to the inside of the wheel, the necessary washers and nuts for holding the wheel in place, one rag wheel 3½ inches in diameter, one 3-inch emery wheel ½ inch thick, together with attaching plug and cord. These outfits are furnished for 110-volt direct or alternating current and can be especially wound to 220 volts.

The alternating-current motor weighs about 25 pounds, while the direct-current motor is much lighter, weighing but 15 pounds. Both motors are very simple, requiring no more attention than a fan motor. In connecting with a source of current supply the cord is attached to the binding post of the motor and the plug inserted in the nearest socket at which the proper current is available.

A Cincinnati company builds a number of portable electric hand-driven tools, including a number of grinding outfits for both external and internal work, radial and hand drills. The electrical tool-post grinder which we illustrate covers a wide range of work and is useful for grinding centers, cutters, reamers, dies, rolls, and the like, as well as for surface, parallel, and internal grinding jobs of all kinds.

The shank of the grinder is clamped in the tool-post of the lathe, the motor carrying on its shaft the emery wheel so that it may be set at any desired angle, in which case the wheel is moved across the face of the center to be ground by means of the handle, as the shank may be set in the tool-post of a planer, shaper, or milling machine, or it can be clamped in an ordinary bench vise. A flexible cord and attachment plug are connected and on securing the plug into any incandescent lamp socket it is ready for work.

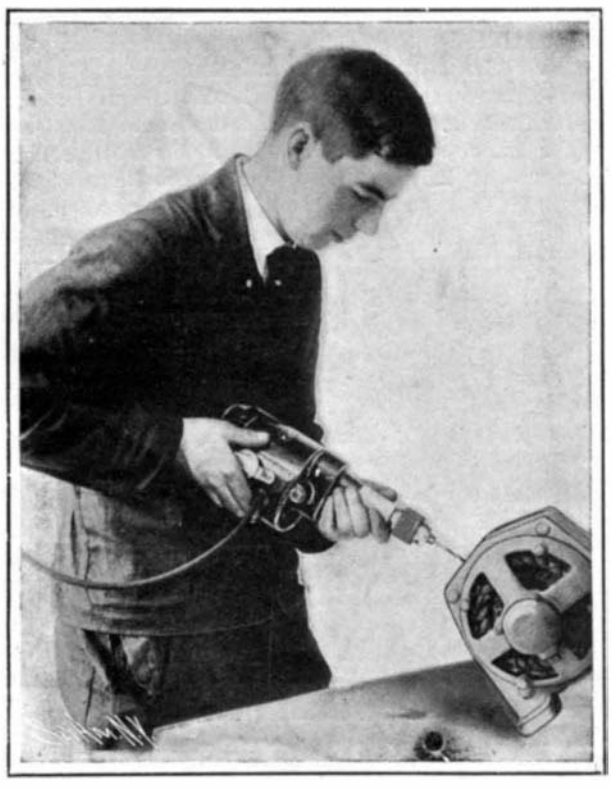
These portable grinders are usually wound for 110 or 220 volts direct current, though in special cases they are wound for 50 to 250 volts and also for alternating current. All parts of the motor are inclosed, making it dust-proof; the spindle carries taper cone bearings and the wear may be taken up by means of a unit on the rear end of the spindle, these being also provided with dust-proof caps. A V slide having a 3-inch travel by means of a worm through the handle *A* is fitted with a gib to take up the wear.

The shank *B* is of steel and is fitted to the hole in the V cap; it is held in position with a screw clamp so that different sized shanks can be used. The extension mandrel *C* is used for internal grinding by removing the regular wheel and screwing the mandrel to the spindle. A tool-rest *D* is a valuable attachment, serving as an index for grinding cutters, reamers, etc.; this detachable tooth-rest insures that each tooth of the cutter will be ground correctly.

Where the grinder is set in a lathe for internal grinding the larger wheel is removed and the extension mandrel is screwed to the spindle in its place. The mandrel *C* will grind a hole from ⅜ to 1½ inch in diameter. The grinder may be set in a milling machine and the cutter ground without removing it and the tooth-rest *D* may be used for indexing as previously indicated.

Attached to the tool-post of a planer it is invaluable for grinding surfaces and for heavy parallel grinding, such as rolls, journals, bushings, and all kinds of hardened work. Heavier grinders operating on ¼, ½, 1, and 2 horsepower are also constructed. In these latter types the bases of the angle plates are bolted in the tool-post rest of the lathe and it has a vertical adjustment to bring it in line with the centers.

A labor-saving hand and breast drill shown in one of the cuts is useful for drilling holes in wood or metal. It



The Portable Breast Drill Motor.

Grinding and Buffing Motor in Use.

Portable Electric Bench Drill in Use.

Method of Using Buffing and Grinding Motor.

is designed to be used wherever the old style hand drill can be used, and not only does it save the strength of the operator but it does the work many times more rapidly, for it is driven continuously and at a much higher speed. The motor is provided with a switch to start and stop it, so that it is absolutely under control at all times, and as the switch is located near the vertical handle it is within easy reach of the index finger. The chuck spindle is so arranged as to allow drilling on a line with the base of the motor and by this arrangement angle and corner drilling are possible.

The drill shown in the cut has two speeds operated by means of the lever on the front end of the motor and with this useful arrangement a slow speed for large drills may be used or a faster speed for smaller ones. These electrically driven tools are without doubt the most powerful and compact machine tools ever built and their extremely light weight makes them especially desirable for all classes of small work.

LEATHER GOODS MADE OF HUMAN SKIN.

BY M. GLEN FLING.

It is a fact well known to a very few skilled workmen, and not known at all to the world at large, that human skin can be prepared, tanned, and made into durable articles quite as successfully as can the skin of our four-footed friends. You can say over and over again to yourself that there is really no reason why human skin should not be so utilized, and you can be told by the workmen who handle it that there is nothing gruesome in the work; you can reason and argue with yourself about the matter, and try to be "matter-of-fact and sensible," and still there will be little shudders running through you and creeping up and down your spinal column at the thought of having the skin taken from a human body and made into some article of wearing apparel.

The only way to overcome this sensation, if you want to get over it, is to examine some of the articles made from the skin, and you will find that the leather is very much like dogskin or pigskin.

Mr. William Hansell, of Philadelphia, has the largest article which has ever been known to be made from human skin. He was particularly fortunate in getting enough of one grain, and succeeded only after a long and systematic search. The article is a beautiful pure white saddle, and any one examining it would be at a loss to tell the kind of skin from which it is made. When you are told, you realize that the pores which show have a familiar look; but when you are given a bit of the skin, of which Mr. Hansell has retained a few samples, you are amazed at the thickness. Three layers of skin you know you have, but knowing how easily a needle prick will draw blood, you are astonished to find what a good thick covering these three thicknesses make. This saddle is made from the skin of one man. A woman's skin, generally speaking, would be too delicate.

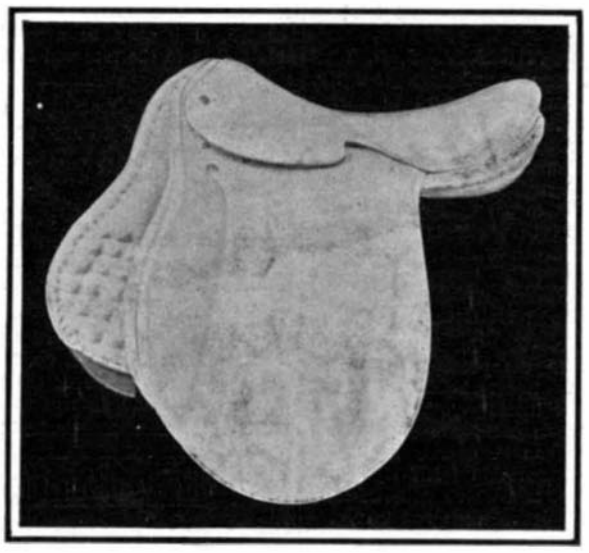
Now, it is not to be supposed that there is a general trade in human leather. Human skin is an exceedingly rare article. Sometimes a physician will have a piece, made into a cover for an instrument case, and occasionally medical students get enough to be made into a purse or a pair of slippers. Patients sometimes have a belt or a book cover or some such article made from a limb which has been amputated. It seems a peculiar mind that would take pleasure in "souvenirs" of this order.

The wearing public are not alone in their aversion to the use of human skin for the purposes to which they unhesitatingly put the hides of animals. It is very hard to get workmen to handle the "leather." Mr. Hansell gave his piece of skin, after it had been tanned, to an old workman who had always made up all his leather goods, and told him to make it into a saddle.

Three weeks the workman kept the skin, and one day he brought the partly finished saddle to Mr. Hansell with some question about finishing. "By the way, Hansell," he remarked as he was leaving, "I wish you would tell me what this skin is. It is the most contrary stuff I ever worked with; it's worse than pig or goat skin."

Very injudiciously Mr. Hansell informed him that it was human leather. At that the workman dropped the half-finished saddle, and left without a word. He never returned, and nothing would induce him to finish his job. Mr. Hansell, after waiting three months, hoping he would change his mind, turned the unfinished saddle over to another workman, but he took good care not to tell him what kind of leather the "contrary stuff" was.

The work of tanning human skin is pretty much the same as that of curing any other skin. Curiously enough, tattooing goes through the epidermis to the under skin, and not a little of the tanning of human skin is done for the purpose of preserving the designs tattooed upon it. Human skin may, however, be tanned with the hair on it, in which case the epidermis is not removed. Scalps so tanned are said to make the best wigs known, and because the tanning is done with alum instead of with oils, as is the case with furs and most of the hair-covered skins of commerce, the resulting leather is much more durable.



A SADDLE OF TANNED HUMAN SKIN.

HUGE BOWLDERS RAISED BY BUCKET DREDGES.

The dredging operations which G. S. Mayes is carrying out for the Dominion government in Sand Point slip of the west side of St. John harbor are presenting difficulties which it is safe to say were not altogether anticipated by the contractor when the work was started.

From a spot to the north of berth No. 2 an area 600 feet wide and extending northwest toward the junction between North Rodney Wharf and Union Street, has been found to consist of immense bowlders varying in weight from nearly 100 tons downward. Firmly imbedded in the mud, which in places covers them to a depth of 40 feet, the rocks have proved extremely difficult to handle, and the time spent in enabling the dipper of the dredge "Beaver" to obtain a correct balance beneath one of the giants frequently runs to hours.

The picture showing a bowlder being raised in the dredge's bucket gives a good idea of the work. The bowlder weighs about 30 tons, and when raised to the surface was found to be lodged endways in the bucket, and jammed so that it could not be removed without considerable delay and trouble. The bucket, it may be

THIS BIG BOWLDER, WEIGHING 30 TONS, WAS DREDGED FROM THE HARDPAN IN 60 FEET OF WATER IN ST. JOHN HARBOR, NEW BRUNSWICK.

mentioned, is 6 feet 2 inches in diameter and is 9 feet 2 inches at its deepest part.

But this bowlder was greatly exceeded by one measuring 12½ by 12 by 7½ feet and weighing about 92 tons, which was raised by the same means. It was dug at a depth of 60 feet below high-water mark. The dredge was then moved, with the stone in the bucket, about 150 feet, when the stone was deposited.

In the prosecution of the work the greatest difficulty has been found in digging out or unearthing of these bowlders, as the material they are found in is marl or hardpan, which is next to impossible to dig. The work has involved the destruction of ten large spuds or anchors, 80 feet long, 38 inches square, incased in heavy iron, as well as the breaking of three heavy steel dippers and three 16-ton dipper handles. The main engines of the dredge are two 24 x 24 cylinders geared up to 1 to 14, so that tremendous power is exerted to remove the bowlders, bedded as they are in such tough material. Another great difficulty is that the abnormal rise and fall of the tide, which frequently reaches 29 feet, makes it difficult to carry on the work at high and low water.

Effect of Duration of Stress on Strength and Stiffness of Wood.

It has been established that a wooden beam which for a short period will sustain safely a certain load, may break eventually if the load remains. For instance, wooden beams have been known to break after fifteen months under a constant load of but sixty per cent of that required to break them in an ordinary short test. There is but little definite and systematic knowledge of the influence of the time element on the behavior of wood under stress. This relation of the duration of the stress to the strength and stiffness of wood is now being studied by the Forest Service of the United States Department of Agriculture at its timber-testing stations at Yale and Purdue universities. The investigation should determine: The effect of a constant load on strength; the effect of impact load or sudden shock; the effect of different speeds of the testing machine used in the ordinary tests of timber under gradually increasing load; and the effect of long-continued vibration.

To determine the effect of constant load on the strength of wood, a special apparatus has been devised by which tests on a series of five beams may be carried on simultaneously. These beams are 2 by 2 inches in section and 36 inches in length, each under a different load. Their deflections and breaking points are automatically recorded upon a drum which requires thirty days for one rotation. The results of these tests extending over long periods of time may be compared with those on ordinary testing machines, and in this way safe constants, or "dead" loads, for certain timbers may be determined as to breaking strength or limited deflections. The experiments of the Forest Service show that the effects of impact and gradually applied loads are different, provided that the stress applied by either method is within the elastic limit of the piece under test. For example, a stick will bend twice as far without showing loss of elasticity under impact, or when the load is applied by a blow, as it will under the gradually increasing pressure ordinarily used in testing. The experiments are being extended to determine the relations between strength under impact and gradual loads.

Bending and compression tests to determine the effect of the speed of application of load on the strength and stiffness of wood have already been made at the Yale laboratory. The bending tests were made at speeds of deflection varying from 2.3 inches per minute to 0.0045, and required from twenty seconds to six hours for each test. The woods used were longleaf pine, red spruce, and chestnut, both soaked and kiln-dried. From the results are obtained comparable records for difference in speeds in application of load. A multiplication of the results of any test at any speed by the proper reduction factor, derived from these experiments, will give equivalent values at standard speed. The tests also show concretely the variation of strength due to variations of speed liable to occur during the test itself. The results plotted on cross-section paper give a remarkably even curve as an expression of the relation of strength to speed of application of load, and show much greater strength at the higher speeds.

It is common belief among polemen that the continual vibrations to which telephone poles are subjected, take the life out of the wood and render it brash and weak. Nothing is definitely known as to the truth or falsity of this idea. Tests will be undertaken to determine the effect of constant vibration on the strength of wood.

During 1905 the oilfields of the United States produced 134,717,580 barrels of petroleum, as against 117,080,960 barrels in 1904. The production was greater by 17,000,000 than that of any previous year. It is significant, however, that the value of the 1905 products was $17,000,000 less than that of 1904. The largest quantity of oil produced by any State in the Union is to the credit of California, which produced 33,427,473 barrels of oil in 1905, or 24.81 per cent of the total output. Next comes Texas, with 28,136,189 barrels or 20.89 per cent of the total, and third Ohio, with 16,346,660 barrels, or 12.13 per cent of the whole.