A *fixed-height* model of this machine, cheaper than the one described, has no rise and fall main adjustment, but the polishing spindle has a 7-in. vertical movement.

(c) *Disc Polisher.*—This has a long vertical rotary spindle attached at its upper end by a universal joint to the motor above and with a 15-in. diameter disc at its lower end. The spindle is telescopic to allow for the adjustment of the disc at the required height, and the universal joint permits an area of approximately 7-ft. diameter of marble or granite to be polished.

Moulded surfaces of marble cannot be smoothed and polished by these machines and are dealt with by hand. Such work is smoothed or " grounded " by using different grades of carborundum powder ; a piece of *snake stone* (Water of Ayr stone) is then applied to complete the smoothing process, after which the surface is polished by applying putty powder on a felt " jack " or pad.

Granite surfaces, especially when they have been axed (see below), are sometimes smoothed by the application of steel shot and emery powder instead of the carborundum blocks. During the first or *shotting* process, the rough surface is rendered perfectly flat by the abrasive action of the shot and water and the rotary cast steel plate of the Jenny Lind Polisher head. The second process is called *emerying*, as emery is used in lieu of shot ; this completes the grinding operation. All traces of the emery are removed, and the glossing or polishing operation is performed with the felted disc and putty powder. Sometimes oil is rubbed into the granite to give a rich gloss.

Instead of hand grinding and polishing moulded granite surfaces, these operations may be performed by a *pendulum* or *slider*. A metal casting of the reverse shape of the required granite section is made and attached to one end of a long rod which is connected at the opposite end to a vertical member which is caused to swing sideways like a pendulum. After the casting has been correctly placed on the moulded granite, it is caused to swing to and fro as the pendulum swings ; shot, emery, putty powder and water are applied in turn during the process.

Pneumatic Dressing and Carving Plant.—This comprises an air compressor, air receiver, cast iron main air pipe, flexible branch air pipes or hoses, pneumatic hammers and chisels. The latter tools include the punch or puncheon, plain, broad or flat, tooth (having serrated edges) and bush chisels ; the bush chisel consists of several steel blades, having sharpened edges, bolted together, and is used for dressing the roughest blocks. The tools are fitted into the pneumatic hammers and the latter are attached to the flexible air hoses ; a cock is fitted near the end of each hose by which the compressed air can be turned on or off by the operator. When the air is admitted to the hammer, the piston within the latter strikes in rapid succession the head of the shank of the tool ; the effect of this percussion action is therefore similar to that obtained by the mason when he strikes a chisel with a mallet. Hence the dressing operation is comparatively simple, as the operator is only required to turn on the air, place the tool on the surface of the stone and guide it in the required direction. These tools are very rapid in action and are capable of doing work ranging from the heaviest dressing to elaborate carving. They are especially effective for dressing intractable stone, such as granite and certain marble. The size of the plant varies, the largest being capable of operating fifteen hammers and employing the same number of masons.

Pneumatic hammers and machinery, such as the frame and carborundum saws, have largely superseded hand-dressing of granite.

Where the latter is still employed, the operations are somewhat similar to those described on pp. 35-38, Vol. I. The scappling hammer or pick is used for hammer-faced and picked work ; fine picked work is produced by a fine-pointed pick or a hammer having a serrated edge ; punched work is obtained by a punch or puncheon which, unlike that shown at N, Fig. 19, Vol. I, is in the form of a hammer resembling a blunt pick. Single axed work is done with an axe or hexagonal headed hammer after the surface has been picked ; this produces parallel lines on the surface which are barely visible in fine axed work. The finest surface given to a block of granite before being smoothed and polished is produced by a hammer called a *patent axe* after the face has been dressed with the ordinary axe ; the head of the patent axe consists of sharp steel blades, one end of the head has a larger number and finer blades than the other and is used after the end with the thicker blades has been employed.

Helicoidal Wire Sawing Plant.—This is used for quarrying stone and for reducing large blocks to a size suitable for the frame saw. It consists of a long wire (of $\frac{3}{16}$ to $\frac{1}{4}$-in. diameter) which travels over and under several pulleys at a rate of approximately 200-ft. per min. as it produces a vertical cut in the stone. The system has not been commonly adopted in this country.

STONE DRESSINGS TO OPENINGS

Examples of dressings to openings additional to those illustrated in Vol. I are shown in Figs. 37-42 inclusive.

Six elevations of entrances are shown in Fig. 37. The same treatment may also be applied to window openings. Those at A, B, C, D and E show semi-circular arches, and that at F is segmental. All of the arches have stepped extradoses.

The voussoirs forming the semicircular arch at A have ears or crossettes. The keystone extends to a string course. A satisfactory proportion of opening is obtained if the 60° diagonal intersects the top of the transome, as shown (see also C). The ashlar consists of alternate thin and thicker courses, that on the left having rusticated joints (such as the channelled joint at A, Fig. 41) and that on the right being flush-jointed.

In all of the examples, broken diagonal lines indicate the size and shape of each voussoir, etc. Ambiguity is thus removed and the bonding is made clear. A working drawing should also have the amount of bed of each stone specified by ringed figures (see Fig. 24, Vol. I).

The treatment at B gives a bold appearance which is particularly effective for large openings. Plain courses alternate with those consisting of blocks having a large projection. The latter, detailed at S, shows a rock-faced middle portion of each block which is emphasized by the contrasting smooth or plain finished mouldings. With certain exceptions, the joints are channelled ; the exceptions include the plain vertical joints necessary to limit the size of some of the voussoirs. The courses above the springing are wider than those below, and a moulded course at the impost, such as is shown on the left, may be preferred to separate the two. The broken construction lines show that the channelled joints and cyma mouldings of the voussoirs are parallel, and thus the rusticated portions are tapered.

The opening at C shows a recessed jamb (see plan K). The arch is similarly recessed and consists of two rings—note the value of the broken diagonal lines as indicating this. The voussoirs of the outer ring is moulded as shown at M. The bold appearance is here shown of the steps detailed in section at M, Fig. 45.

Another example of a two-ringed arch is shown at D. This differs from C in that the inner ring is moulded (see O) and the bed joints of its voussoirs coincide with alternate bed joints of the outer ring voussoirs. The voussoirs course with the ashlar shown on the left. For brick walls the voussoirs should course with the brickwork as shown on the right.