

ideal, but, for the most part, this location is dictated by the position the lantern occupies on the clapper. As the lantern is usually set low down on the clapper, there is then no room to put in the set screw at its most efficient point. So a compromise position has to be chosen, and this is the one shown in the diagram.

#### The Self-Act

In order to machine a piece of work completely the work table needs to be moved along, so that as it travels backward and forward, the cutting tool can fully cover the work. At the same time the tool itself needs to be fed to the work under controlled conditions. Both these requirements must be met by properly designed machine slides. In many large professional shaping machines both of these slides are provided with an automatic feed, usually called "The Self-Act". In small machines, however, and with hand-powered shapers in particular, the self act is confined to the lead screw of the work table. The details of the mechanism necessary are given in the chapters dealing with hand and power-driven machines, whilst an automatic down-feed, that the author has fitted to his own power shaper, will be described in a later chapter.

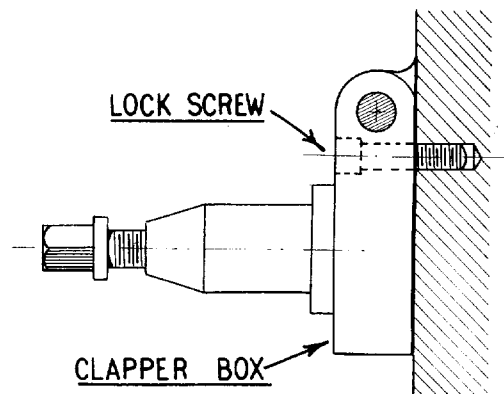


Fig. 7 Locking the Clapper Box with American Tool Post

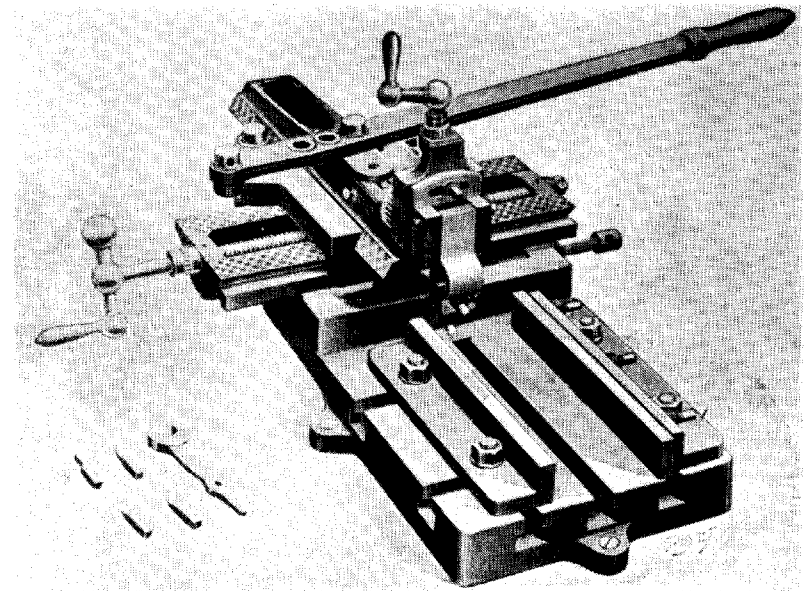
## CHAPTER 2

# Hand Power Machines

FOR MANY PURPOSES in the small workshop a shaping machine operated by hand will suffice quite well. In years gone by, as any comprehensive tool catalogue of the time will confirm, there were many hand shapers to choose from. A typical example, from the catalogue of Richard Melliush dated 1912, is illustrated in Fig. 1.

The machine has a large cast base plate provided with T-slots that are used to house the bolts securing the somewhat elementary machine vice seen in the illustration. The vice consists of a pair of angle plates, one having a moving plate that can be used to grip any work that needs machining. The angle plates can be turned through 90 degrees to the position shown, enabling work to be machined against the standing jaw as and when required.

Fig. 1 Shaping Machine 1900-1912



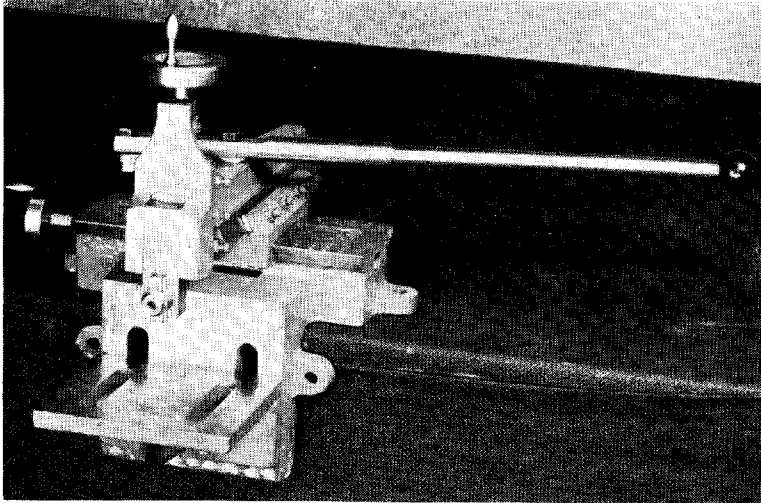
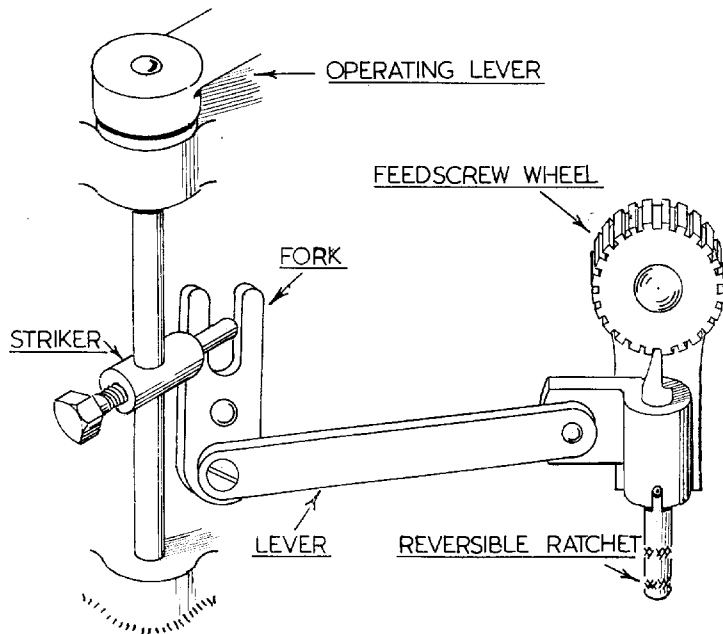


Fig. 2 Amateur made hand-powered machine

Fig. 4 The Drummond Self-Act



All slides were substantial having feed screws fitted with graduated collars allowing accurate dimensional machining to be undertaken.

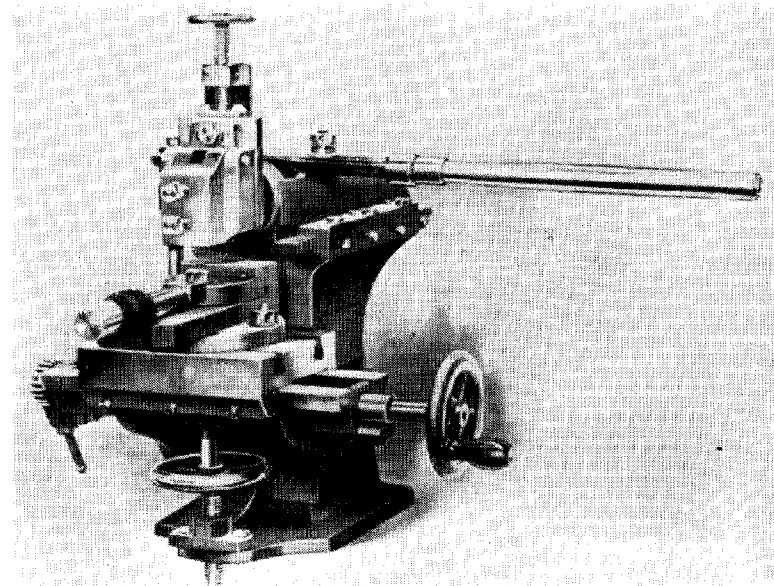
Rough positional adjustment of the ram was available and it was possible to select a range of operating leverages as may be seen from an examination of the lever itself. This has three bushed holes to accept the screwed pin attached to the ram. The operator could then readily select a leverage, and thus a ram travel, suited to the work in hand.

Many similar shaping machines were not fitted with automatic traverse to the saddle, and the example illustrated was probably no exception.

The Tool Slide and Clapper Box have all the requirements for machining angled and overhung work, while the tool holder was designed to accept the short tool bits seen to the left of the illustration. Independent angular adjustment of the clapper box is essential if overhung work, such as tool slides, is to be undertaken.

The little machine depicted in Fig. 2 has no such provision, which is a pity, for though it does have an American type tool holder this in itself is no substitute for a clapper box assembly that can be swung over to deal with overhung machining when required.

Fig. 3 The Drummond Shaper



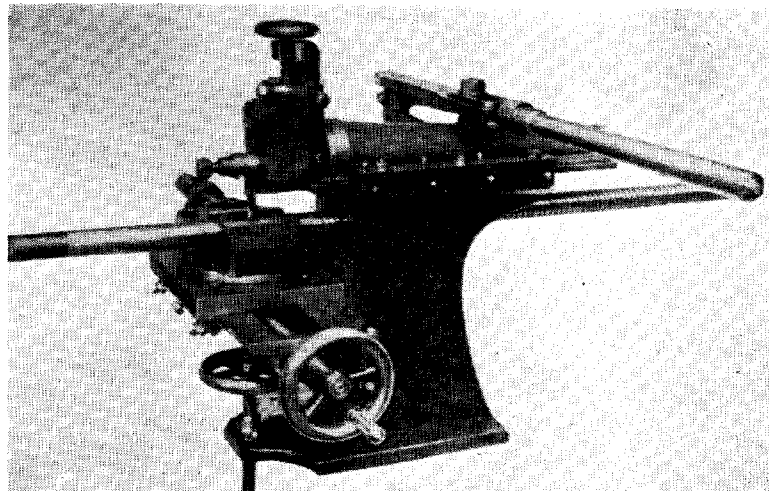


Fig. 5 The Drummond Shaper (later version)

#### The Drummond Hand Bench Shaper

We come, now, to a machine that proved to be a landmark in the provision of shaping equipment suitable for use by the amateur or the light engineering workshop. The shaper in question had a few minor points of criticism, what machine has not, but there is little doubt that the hand shaping machine once made by Drummond of Guildford was an outstanding and practical piece of equipment. Drummond's shaper, illustrated in Fig. 3, was, or is because there are examples of the machine still in use, a fixed head hand shaper developed on the lines of the powered tools then found in many machine shops. The body of the machine is a stiff box form casting having a flange provided with bolt holes for fastening the machine to the bench or the special cast iron stand once available.

The work table, some 6 in. long by 5 in. wide is carried on a knee that has a vertical movement of  $4\frac{1}{2}$  in. and is controlled by the feed screw and handwheel seen at the front of the machine. The table itself moves on a slideway machined from the knee casting, this movement being imparted by a horizontally placed feed screw with handwheel set in the body of the knee.

The feed screw can be actuated either by hand or by the reversible ratchet and wheel that may be observed to the left of the table. The ratchet itself is driven by a link attached to the striking mechanism situated on the left-hand side of the shaper and therefore not observable in the illustration. The striker itself is mounted on the vertical spindle carrying the main operating spindle and engages a pivoted

fork to which the ratchet link is attached. The striker is clamped to the spindle and can be moved in or out of engagement with the fork by undoing a single lock screw. This arrangement serves also to adjust the stroke of the striker and so controls, within limits, the feed rate of the self-acting mechanism as a whole.

The mechanism of the Drummond Automatic Feed is depicted diagrammatically in Fig. 4. The feed screw itself is fitted with a friction pad to inhibit reversal during the idle stroke of the self-act.

Early machines had tool slides fitted with English pattern tool holders. Later production, as illustrated in Fig. 5, introduced an American-style toolpost having many advantages for the user. The illustration also demonstrates one of the facilities of their shaper that Drummond stressed, this is the ability to accommodate long shafts for the cutting of keyways or other machining operations, a provision made possible by the box-like construction of the main casting.

Neither the feed screw for the tool slide nor the work table feed screw had index collars fitted to them. This was a somewhat inexplicable omission, not subsequently rectified, so far as the author is aware.

#### The Drummond Machine Vice

The vice fitted to the shaper is of simple but robust construction. The base is graduated so that angular settings of the vice can be made. The moving jaw is fitted with a clamping screw to ensure that, when the jaw has been set against the work and tightened by the square thread screw passing through the lug at the end of the base, the work itself can be secured against any possible unwanted movement.

#### The Cowell Shaping Machine

We have already seen that shaping machines are divided into two classes; those in which the ram slide is fixed and is part of the main casting, and the others that have a ram slideway machined in a saddle movable along the base member that forms the body of the shaper itself. The Drummond is an example of the first type, whilst the machine now to be described, made by E. W. Cowell of Watford, falls into the latter class. We have said "made by E. W. Cowell . . .", but this is not strictly true because the firm in question only supplies castings and certain heavy machined details outside the scope of the amateur or small workshop, leaving such turning as remains within the capability of  $3\frac{1}{2}$  in. centre lathe. The salient dimensional features of the machine are as follows:

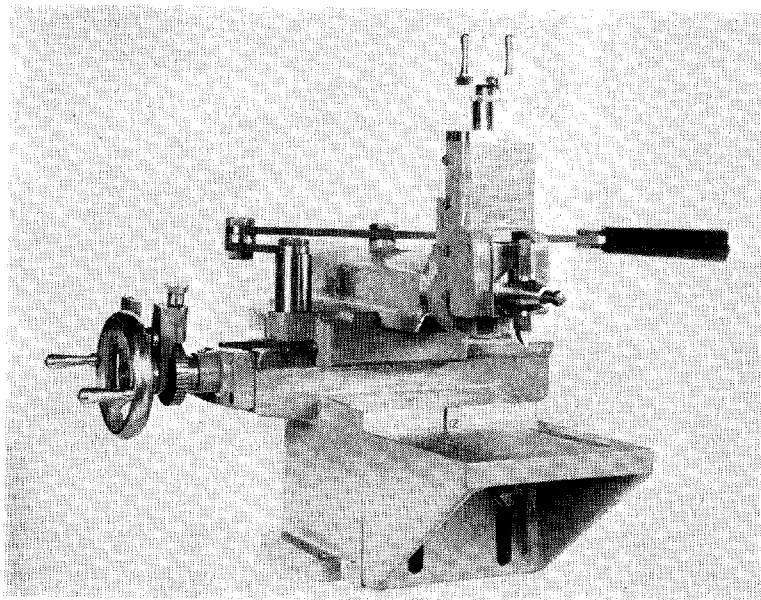


Fig. 6 The Cowell Shaping Machine

Maximum size of work shaped 6 in. by 6 in.

Size of table 6 in. by 6 in.

Feed of tool slide  $2\frac{1}{4}$  in.

Maximum height, table to tool point 5 in.

The automatic feed provided has five rates, feed varying from 0.0025 in. to 0.0125 in.

As will be seen from the illustration Fig 6, the Cowell shaping machine is one of great rigidity, weighing some 65 lb. when finished. The saddle supporting the ram is carried on a substantial slide machined from a heavy box-form casting, through which the saddle feed screw passes. A single long bearing supports the feed screw, the bearing housing being attached to the end of the box-casting as seen in Fig. 7. A ratchet-and-wheel system forming part of the self-act mechanism is located on the feed screw and is driven through linkage from a lay shaft carried behind the main casting. The layshaft is fitted with a toggle device controlled by a positionally adjustable striker fastened to a machined face on the ram itself. These details are illustrated in Fig. 8.

### The Clapper Box

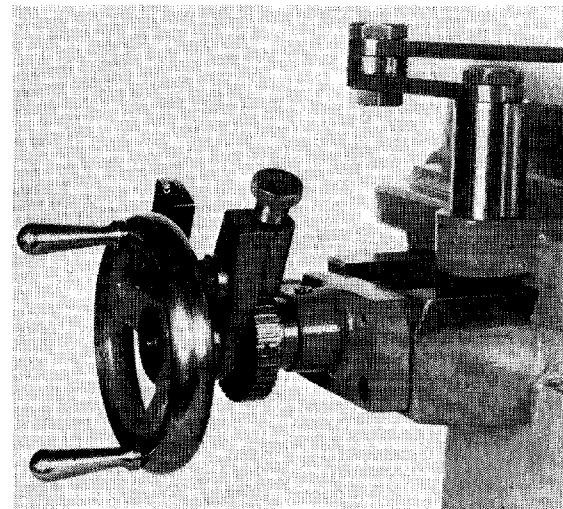
The Clapper box fitted to the Cowell shaping machine swivels to either side of the vertical. It is fitted with a lantern-type or American toolpost that has many advantages over the English pattern post. The tool slide to which the clapper box is attached is provided with an index collar and can itself be swivelled through 180 degrees. The components in question may be clearly seen in the general illustration of the machine itself.

### The Perfecto Hand Shapers

For those who, in the first instance, need only a simple machine, the Perfecto Engineering Company of Leicester have included just such a shaper in their range of machine tools. The unit in question is illustrated in Fig. 9. It has a 5 in. stroke and a work table 6 in. by 6 in. with a height adjustment of 2 in. in relation to the machine as a whole, being fastened to its apron and guided by a key engaging both table and apron.

The bed of the shaper is of box form construction and is ribbed for strength. The ram, also of box construction, has a full bearing in the saddle at any position of the stroke, and is operated by a quadrant gear engaging a rack fastened to it. The tool slide, fastened to the end of the ram, swivels through 360 degrees and has a gradu-

Fig. 7 The Cowell Self-Act



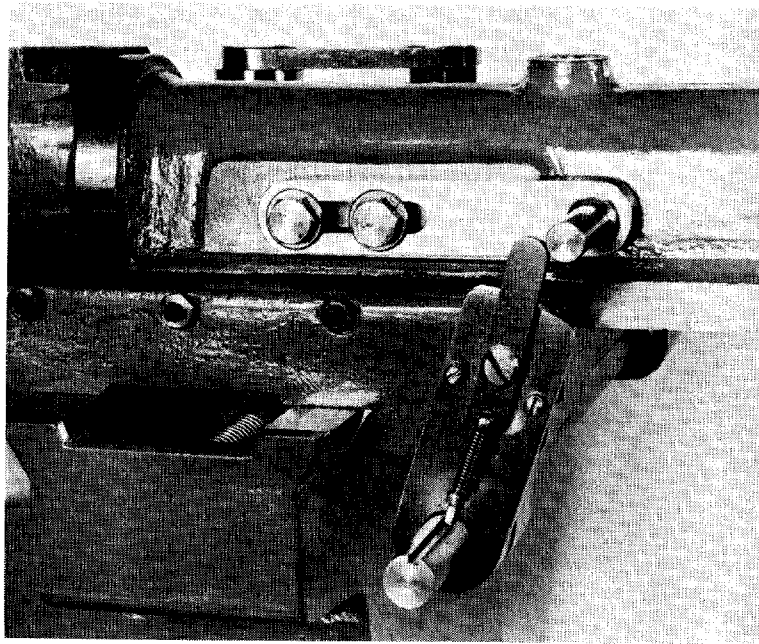


Fig. 8 The Cowell Self-Act

ated base plate enabling angular work to be carried out accurately. The clapper box itself also swivels when required for machining overhung work.

Fig. 9 The 5" Perfecto Shaper

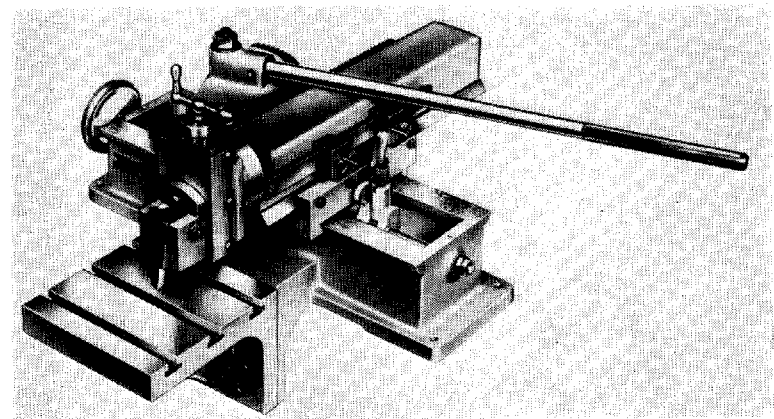
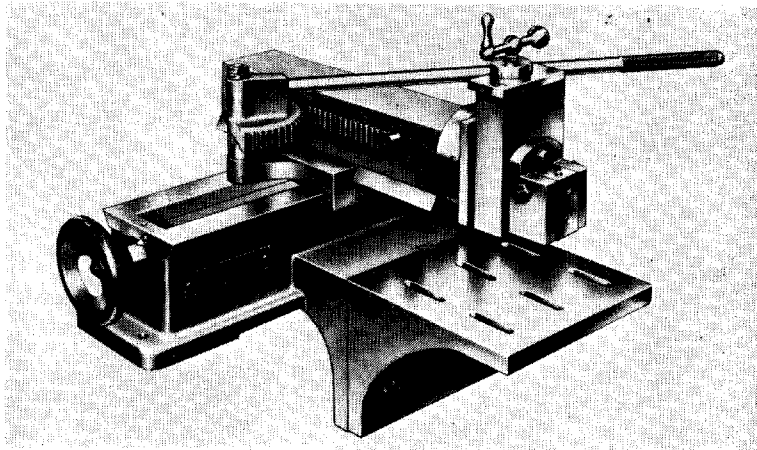


Fig. 9A The 5" Perfecto Hand Shaper

As befits a very simple machine there is no automatic feed to the saddle, all movement having to be controlled by the handwheel fitted to the feed screw.

For those who feel that some form of automatic feed is essential, Perfecto Engineering have introduced a 5 in. shaper having this facility. The machine itself is in fact the simple machine just described fitted with a fixed automatic feed of 0.005 in. for each stroke of the ram. The mechanism acts on the feed screw and is operated by adjustable strikers set on the side of the ram. (See Fig. 9A).

A machine of somewhat greater capacity is the 7 in. shaper. The machine has all the family attributes of the Perfecto shaper previously described. In this larger shaper the work table has T-slots which allow more versatility in the mounting of work, though has no greater surface area than the work tables fitted to the other Perfecto shapers.