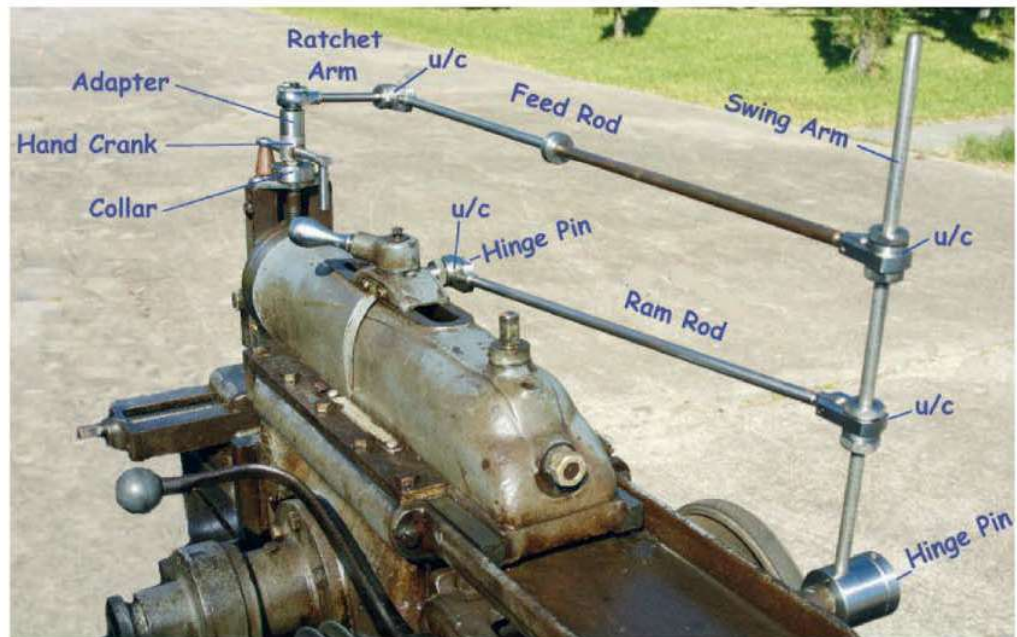


A Vertical Power Feed for your Shaper

Dennis E. Fielder
improves a workshop
workhorse.

PART 2

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The adapted machine with its bits and pieces.

You may well ask why you would need a vertical feed system on your shaper. I can only tell you that I often wonder how I got along without it. Not only does it do a good job but it's fascinating to watch it in operation and your fellow model engineering buddies will be enthralled.

The angular motion, or the number of clicks of the ratchet arm drive, can be adjusted by changing the position (radius) of the feed rod on the ratchet arm and/or the position and distance between the two universal couplings on the swing arm. If there is no

distance between these two couplings there is no relative motion between the two rods and no rotation of the ratchet arm. As the stroke is increased, the angular motion of the swing arm would increase. The resulting increased travel of the feed rod compensates for the motion of the ram but increases the angular deflection of the ratchet handle; and vice versa.

The feed per stroke can be adjusted by changing :-

- 1) The radial position of the feed rod coupling on the ratchet arm, or
- 2) The radial position of the ram rod coupling on the swing arm, or
- 3) The distance between the couplings on the swing arm, or
- 4) All the above.

These changes determine the number of clicks of the ratchet drive between ram strokes. One ➤



Head vertical - down on forward stroke.



Head vertical - down on backward stroke.



Head vertical - feed disabled.



Head + 45degrees - down on forward stroke.

Table 1			
Photo	Setting	Ratchet rod	Feed/resulting feed
14	Screw down Screw up	To left of ram To left of ram	Down on forward stroke/ Up on backward stroke
15	Screw down Screw up	To right of ram To right of ram	Down on back stroke/ Up on forward stroke
16	Any	Any	No feed available

The ram rod and feed rods are at the same location on the swing arm so the vertical power feed is disabled. Manual vertical feed is available. Manual and power horizontal feeds are available.

click would be about three thou on my old machine - or whatever for the minimum stroke of a friction 'ratchet'? Feed rate is a function of ram stroke rate.

The issue of whether to feed on the forward stroke or the return stroke can be resolved by rotating the ratchet handle 180 degrees (photos 14, 15, 16 and 17). The further availability of a reversible ratchet changes the direction of the feed (up - v - down). The set-ups in table 1

are possible for the feed system and apply to any angular setting of the tool post.

An additional benefit of the high vertical clearance of the swing arm is being able to rotate the vertical feed assembly (tool post) about the ram centreline. Needless to say, nothing is perfect and there will be ultimate limitations on the angle of rotation imposed by interference with the feed rod, further modulated by the direction of the

vertical feed (forward - v - reverse stroke). However, the set-up on my old machine allows the tool post to be rotated up to 45 degrees to either side (photos 17, 18, 19 and 20).

Note: it is extremely important to manually cycle the shaper through one forward and return stroke for assurance that there is no interference between any and all of the moving and stationary parts before applying power.

The above procedures may require minor adjustments to the length of the feed rod to keep the ratchet arm at the best angle for the same ram stroke and position. However, to accommodate the ram being located at different positions relative to the ram drive clamp (or the work piece, or the base of the machine) using the feed rod clamp (photo 21), the

length of the feed rod must be adjustable by plus and minus half the available adjustment of the ram position.

The relatively long swing arm combined with the variable length of the feed rod are important factors in adjusting the ratchet feed for many different set-ups.

Note: the vertical power feed and the existing horizontal power feed are not mutually exclusive and, although not recommended, both can be applied simultaneously.

AGAIN note: for each new set-up it is extremely important to manually cycle the shaper through one forward and one return stroke for assurance that there is no interference between any and all the moving and stationary parts before applying power.

Starting and stopping

Now having got the feed system operating, an all-important question is how to start and stop it. Generally speaking, it stops and starts with the machine motor. Starting and stopping the vertical feed while the machine is in motion could be accomplished by setting the feed switch on the ratchet arm to its centre position - not always possible because most ratchet wrenches do not have a neutral or centre off position. It could be solved with a custom ratchet motion that does have an OFF position - I have not done so, and any



Head + 45degrees - down on backward stroke.



Head - 45 degrees - down on forward stroke.



Head - 45degrees - down on backward stroke.

such solutions are left to the ingenuity of the reader.

Temporary disconnection of the feed is best accomplished by setting the two rod positions on the swing arm to provide zero feed (photo 16). A more or less permanent disconnect for the feed system is to remove the ratchet arm from the feed screw adapter (lift it off) and unscrew the feed rod from the swing arm (unscrew it from the universal coupling).

One final concern – what happens if you go off for a ‘cuppa’ and forget that the machine is still running (**DO NOT DO THIS!!**) and the feed is about to pass the tool through the workpiece, the vice or the knee or whatever happens to be in the way? I might point out that the same issue prevails for the built-in horizontal power feed for which there are no limit stops on the old machines (and for which I share no responsibility). When I got to this point I realized that my schemes might be considered incomplete so I offer the following suggestion: a set of adjustable stops on the slide of the vertical feed that could operate micro-switches that cut off the electric power to the motor. Similar stops and switches could be added to protect the horizontal cross feed. Please note - these are no substitute for proper operator attention and diligence. **In all**

respects; common sense and experience shall prevail in the workshop.

In summary

All the discussions and pictures accompanying this article relate to an Atlas 7 inch Shaper, first sold in the US in 1938 and for many, many years thereafter. In principle, small shapers have not changed much since then. If you want to try this scheme out you will probably have to adapt things to your particular machine. Otherwise the system is pretty much as described.

Key components of the feed system are:

One swing arm hinge pin attached to the main body of the machine.

One ram rod hinge pin attached to the body of the ram drive clamp (used to fix the ram position).

One long swing arm mounted on the main body hinge pin, the boss has a brass/bronze sleeve to match the diameter of the hinge pin.

Two retaining rings - to keep the swing arm boss and the ram rod u/c on their respective hinge pins.

Four universal couplings (fig 1). A set screw locks the thimble to the rod/arm; except for the ram-rod-hinge-pin that replaces the thimble.



Feed rod length adjustment clamp.

Two rods attached to the swing arm using universal couplings - connections can be set at different positions along the length of the swing arm:

- The ram rod, fixed length, connected to the ram rod hinge pin using a universal coupling.
- The feed rod, adjustable length, connected to the ratchet arm using a universal coupling, and including one feed rod clamp to set the length of the rod.

One 1½ inch graduated collar – replaces the original collar.

One reversible hand crank – replaces the original crank.

One ¼ inch square socket adapter with set screw, on the top of the vertical feed screw.

One ¼ inch square reversible ratchet arm - commercial quality with 6 inch arm.

Some dimensions:

Diameters

- Ram rod: swing arm and the ratchet arm are the same diameter – ⅝ inch for my machine; ¾ inch recommended for larger machines.
- Feed rod: ⅝ inch diameter, telescoped with a ⅝ inch I/D and ⅝ inch O/D tube, again, larger for larger machines.
- Ram Rod hinge pin: ⅝ inch diameter (match for universal coupling thimble).
- Swing Arm hinge pin: fit to existing ½ inch diameter pin or new ½ inch custom.
- Adapter: 1⅜ inch diameter x 1⅜ inch long (or custom), No. 6:32 socket set screw, tapped to match feed-screw - ⅝ inch x 24 tpi, broached for ¼ inch square socket.

- Crank hub - 1⅜ inch diameter x 1⅜ inch long (or custom), ⅝ inch keyway.
- Graduated collar: 1½ inch diameter x ½ inch long, engraved - socket head set screw No. 6:32.
- Universal Coupling (fig 1).

Lengths

- Swing arm: 12 inches to centre of hinge pin (hinge pin on same level as ram slides).
- Ram rod: Approximately 15 inches between the major axes of the two universal connectors such that when the ram nut is in the center of its stroke and connected half-way up the swing arm when the swing arm is vertical.
- Feed rod: Bar stock, 18 inches; tube stock, 14 inches. Adjustable 22 to 28 inches between major axes of two universal connectors.
- Ratchet arm: 6 inches overall. ⅝ inch shaft, 4 inches long.
- Adapter: 1⅜ inch.
- Crank hub: 1⅜ inch.
- Collar: ½ inch.

Materials

Bars/rod: Stainless 303/304 or as available to avoid long term rusting and corrosion.

Universal Couplings: Stainless 303/304, commercial roll pin ⅝ inch diameter x ¾ inch long.

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