

“Tom & Jerry”

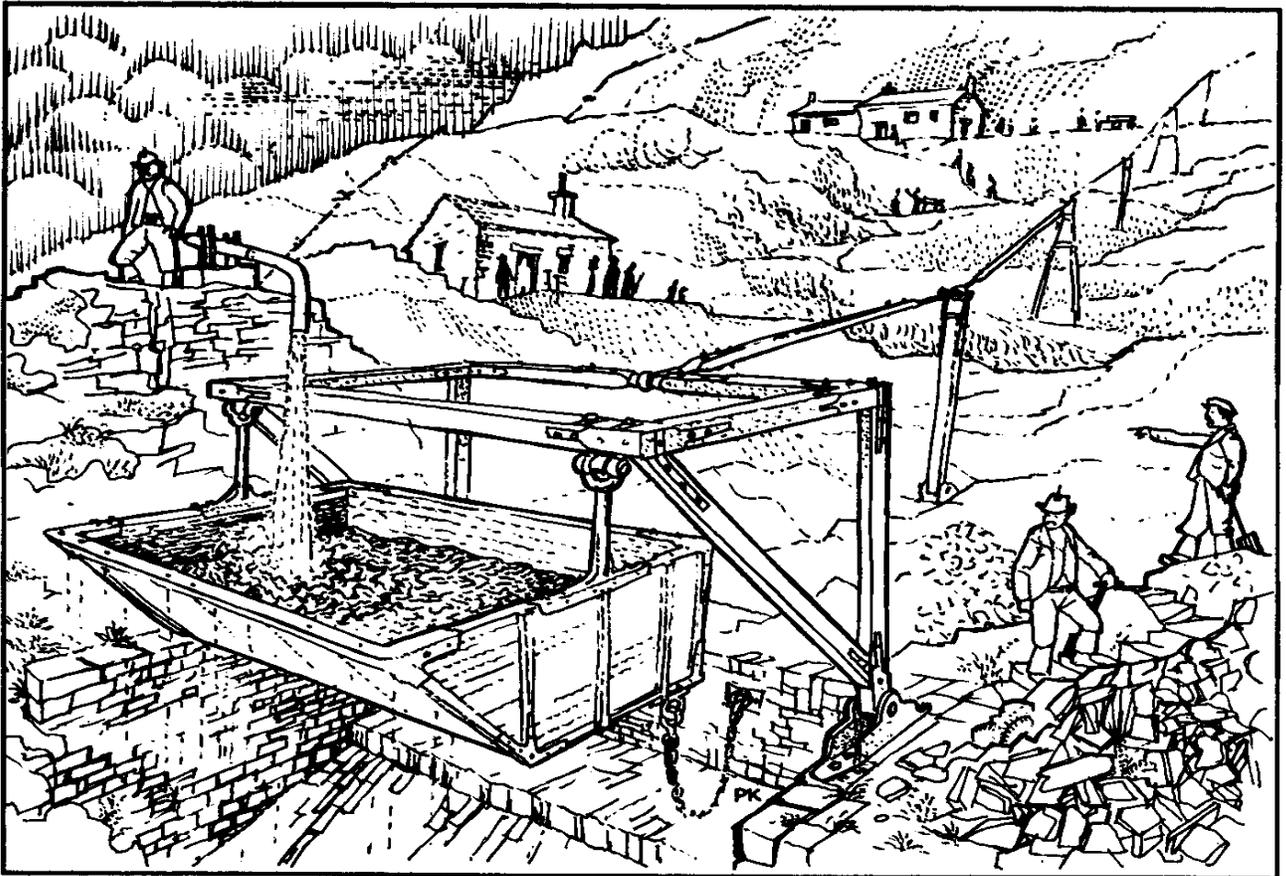
‘Great Orme Mines’, British Mining No.52, C.J. Williams, 1995, pp.33-34

“ ... Water was not much of a hinderance to the miners until the workings neared sea-level, when mechanical pumping became necessary. As well as a steam-engine, the Old Mine also used a primitive flop-jack engine. This engine (sometimes referred to as the Tom and Jerry) was at Gogarth on the West Shore, and was fed by a spring which is still visible on the hillside above. Unfortunately no detailed description of this device is known, but it seems to have been a triangular frame, one angle of which was pivoted at ground level. Attached to another angle was a large tank which was filled with water through iron pipes from a reservoir below the spring. The third angle was attached to 1300 yards of *'brammock rods'* or flat rods supported on hinged pivots and extending over the hill to Vivian's Shaft, which was the main pumping shaft. Another 250 yards of brammock rods ran to the bottom of the shaft. When the full tank reached the ground, it emptied automatically and the weight of the returning rods worked the pumps. The installation of the engine is credited to Thomas Jones of Newmarket, Flintshire, the agent of the New Mine from 1827. Tom and Jerry, better known today as the cat and mouse characters in the MGM cartoons, were riotous men-about-town in Pierce Egan's *Life in London* (1821). ...:

‘The Old Metal Mines of Mid-Wales’, Part 1, D. Bick, 1992, p.46

“ ... The final means of applying water for pumping to be mentioned here was variously known as the Flop-Jack, Tom & Jerry or Water-bucket pump. This primitive and probably very early device consisted of a large tank on a rocking beam at the opposite end to the pump rods. Water flowed from a spout into the tank which when full, overbalanced the rods and so provided the lifting stroke. At its lowest point the tank emptied via a valve which automatically opened, permitting the rods to descend under their own weight. Except in special cases the simplicity of the contrivance did not compensate for its limited power output and low efficiency. Applications were relatively few; examples were used at the Llandudno copper mines and at Bonsall's Level Fawr, Cwmystwyth; there was also a 'Tom & Jerry' shaft at Gwern Y Mynydd lead mine near Mold. Outside Wales the Ecton copper mines employed a large device of this type in the 18th century. ...” *

- For further reading see G. DOWNS-ROSE and W. S. HARVEY, 'Water-bucket Pumps and the Wanlockhead Engine'. *Industrial Archaeology*, 1973.



Artist's impression of the Tom and Jerry engine.

"Tom & Jerry" mechanism is the closest prototype to the Discrete Power Converter (DPC), in which can already be found quite a lot of common technical features.

Note the most significant:

- source of motive power of the mechanism is the weight of the fluid mass (water, for example) flowing by *gravity* force (due to the difference in geodetic level) on "input" of the machine;
- a mechanism has a capacity (as bucket) to accumulate the working masses, enough to make one stroke;
- there is also a mechanical traction (as chain of connected rods) for the transfer of work effort to the load (piston pump in the mine, in that case);
- shape of bucket provides its spontaneous emptying of the working masses at the end of the stroke;
- faucet-valve to control the mode of operation of the mechanism, by *operator*;
- the mode of operation of the mechanism-discrete and periodic, each work cycle consists of the time of accumulating of the working mass, and of the time of stroke;
- in principle, the mechanism could work with the various working masses (pulp, crushed stone, sand, grain, etc.)

Distinctive features (as claims of DPC invention) are making the differences (Fig.1) from the "Tom and Jerry" and extends its functionality as follows:

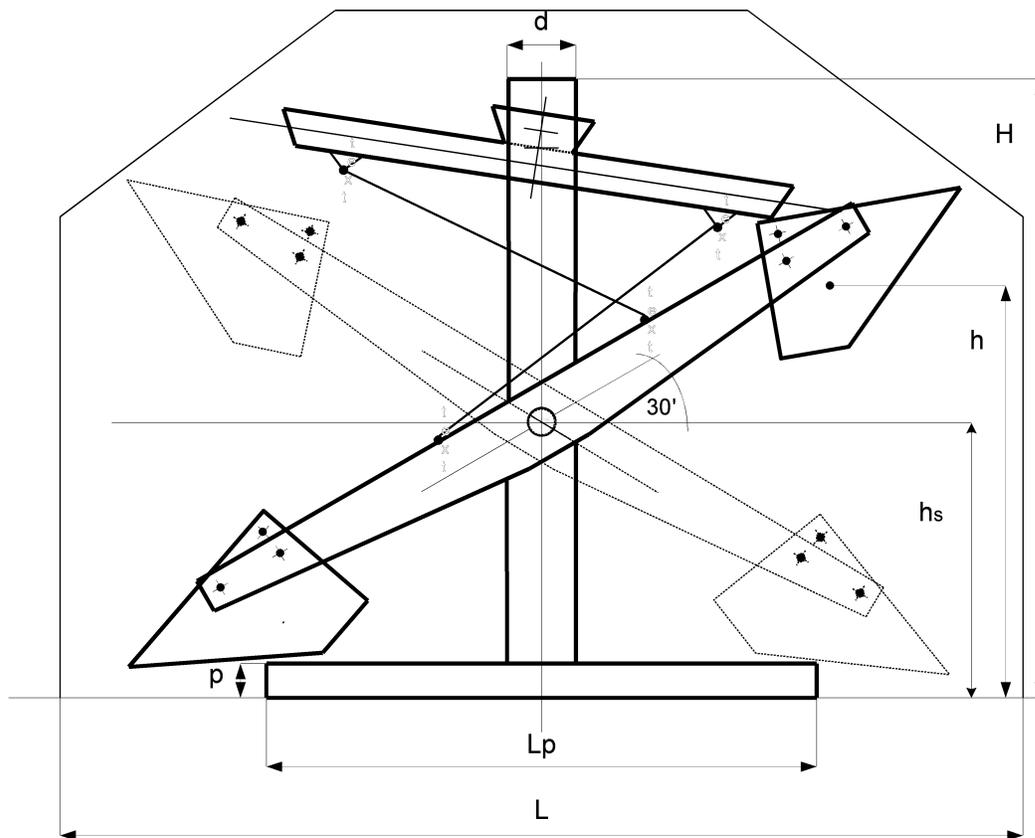


Fig.1

- the presence of symmetrical structure (two-drive instead of one) to periodically make working stroke of each of the two shoulders of the mechanism;
- the existence of two symmetrical mechanical feedback to enable automatic operation of auto oscillations in the form of periodic DPC working shoulders mechanism;
- the presence of rocking beam which supply alternate (by two mechanical feedback) two buckets with flowing mass under gravity force;
- possibility of connecting four mechanical loads (instead of one) - two under working shoulders (vertical plane) and two (front and back) on axle (in the horizontal plane);
- possibility of automatic separation in the input stream of the working masses into two symmetrical and equal half-thread on "outputs" DPC - automatic dispenser;
- ability to repeatedly multiply the force on the shoulders of the levers, as well as the angular momentum axis of the DPC by increasing the length of the beam;
- ability to adjust by using the tap/flap/period switching frequency of shoulder mechanism, respectively - average value of output power.