Nag's Head Striking

by John Robey.

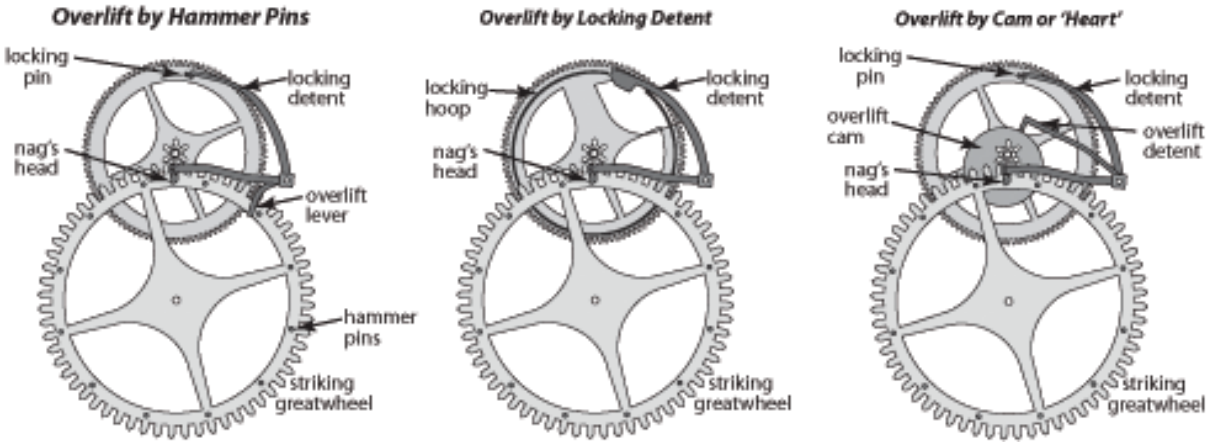
The description in ***HJ August 2011*** of replacing a missing nag's head on a Dutch clock has prompted a closer look at this striking system, which is unfamiliar to many British horologists, although widely used in other parts of Europe. The earliest evidence for striking using warning is just before 1500 and earlier than this the nag's head was the only method of letting off the strike. In Britain the nag's head was only used on the very earliest clocks, such as that in Salisbury Cathedral. By the time domestic clocks began to be made in England warning was established in neighbouring France and Flanders, so this method was used exclusively thereafter here. While it is usually unwise to use the words 'always' and 'never' in horology as exceptions often eventually appear, in this instance it can be confidently said that British domestic clocks (and also turret clocks apart from the very earliest ones) never used the nag's head — unless anyone knows otherwise.

In Germany and The Netherlands the nag's head continued for a long time, and on some Dutch clocks into the 20th century. It is interesting to note that while in England it is known as a nag's head, in other countries it is nowadays called various parts of different animals. In Germany it is a stork's beak (*Storchenschnabel* or the common variant *Storchschnabel*) or sometimes a pelican's beak, while the Dutch call it a goat's foot (*bokkepoot*) or a sometimes a deer's foot. Despite its non-appearance on British clocks the English term is well established so it will be used here.

Why is a nag's head, warning (or alternatively a flirt) necessary? We will ignore the added complication of some special warnless rack-striking arrangements.[1] The strike is let off by a pin on a wheel that moves very slowly, usually once an hour. If this was to simply lift a lever that unlocked the train then striking would continue with no means of controlling the number of blows until the tip of the lever fell off the pin. It would be theoretically feasible to arrange for the striking train to be unlocked just before the lifting piece fell of the pin, but backlash and wear would make this arrangement very unreliable and not a practical proposition. In effect the train has to be unlocked when the tip of the lifting piece is on the right-hand side of the pin, but falls on the left-hand side and relocks after the first blow.

2. Rear view of a large iron clock about 1600-50 with only two wheels in each train (later escapement and wheels not shown). On the left is the striking arbor with the countwheel detent, overlift lever and locking detent (just visible behind the locking wheel).

To achieve this a flexible tip (the nag's head) which has a restoring force of either gravity on large clocks or a light spring on small clocks, is used. There has to be a good deal of free play as well as a method of providing overlift. There is just one arbor which carries the lifting piece, locking detent,



1. Three methods of providing overlift for nag's head striking. A two-wheel striking train and an eccentric disc as a cam is shown, as on the clock in Figures 2-5. With three-wheel trains locking is on the third wheel with the cam (often with two slots) on the second wheel. The countwheel detent, on the same arbor as the other levers, is not shown. The nag's head is lifted by a pin on the going greatwheel (not shown), not, as it might seem, by a pin on the striking greatwheel.

countwheel detent and overlift lever. It is sometimes called the one-arbor method, compared to the two-arbor warned strike. The sequence of events is as follows:

a. The lifting pin contacts the nag's head and moves it to the right without moving the lifting piece.

b. When the nag's head meets a stop the lifting piece is then raised until the train unlocks.

c. As soon as the train runs the overlift lever raises the lifting piece even further so that the nag's head is clear of the lifting pin and after the first blow of the hammer it falls on the other side of the pin ready for the next sequence.

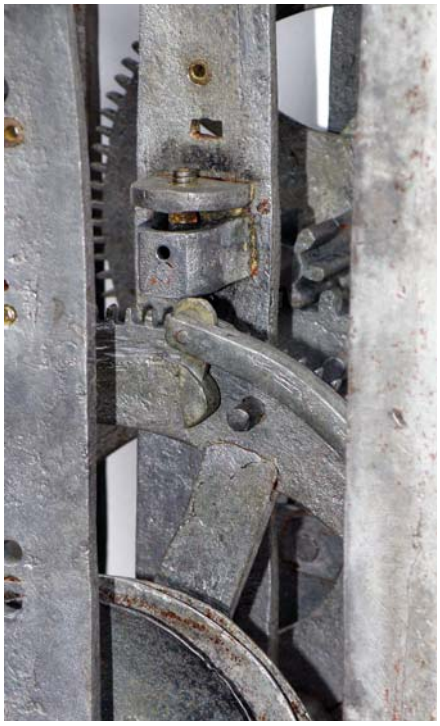
d. The nag's head has flipped from one side of the lifting pin to the other with virtually no further movement of the pin. Multiple blows are controlled by the usual countwheel.

Overlift can be provided by one of three different ways, **Figure 1**. The earliest arrangement is for the overlift lever to be raised by the hammer pins. This was used on horizontal table clocks and the earliest iron clocks, but it is not particularly positive. Another early method was to use a hoop with a gap for locking (as on an English lantern clock or 30-hour longcase clock) rather than a locking pin. The locking detent has a sloping lower edge so when the train is released the leading edge of the hoop pushes up on the slope and provides overlift.

The favoured later method was a cam (called in German a *Herz* or heart, from its usual shape) with a lower section or a slot to allow the overlift lever to drop and the system to relock. If the cam is on the same arbor as the locking wheel, then there is only one slot (*Einfach-Herz* or simple heart), but if the cam is on the next arbor it usually has two slots (*Doppel-Herz* or double heart). Note that, like a countwheel, the overlift detent does not lock in the slot, locking being by a separate detent acting on a pin on the second wheel. Only a hoopwheel performs the dual action of overlift and locking. Since the movement of the overlift detent on the heart is greater and the heart moves faster than the pins on the greatwheel, the action is more positive.

The illustrations show a few examples of clocks with typical nag's head striking. The first, **Figure 2,** shows a large iron clock 23in tall made about 1600-50, possibly in Poland, with

4. A pin on the greatwheel moves the nag's head without raising the lifting piece.



5. After overlift the nag's head falls back to the left-hand side of the pin.

3. The striking arbor with the nag's head and the three other detents. Also the vertical hammer.

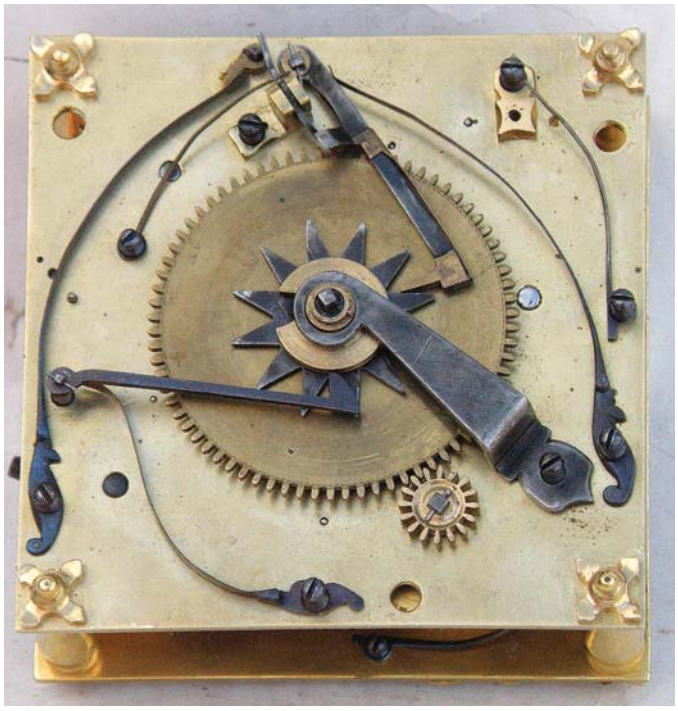
details of the strike work in **Figure 3**. The striking train has only two wheels (greatwheel and locking wheel) and a fly, while the original going train would also have had only two wheels (great wheel and crownwheel) and a balance escapement. The strike is let off by a pin on the going great wheel, which rotates once an hour. Hence, so that the hand always indicates the hour when the bell sounds the hand is fixed and it can only adjusted to read the correct time by disengaging the pallets and allowing the train to run. This clock has had the hour wheel modified and an adjustable hand fitted, so that now a complicated procedure has to be performed to synchronize the hand with the strike.[2]

Figure 4 shows the nag's head moved by its full amount with the train about to be unlocked. In **Figure 5** overlift has occurred and the lifting piece dropped so that the nag's head has fallen back by gravity and it is now behind the pin. This clock originally had overlift provided by the hammer pins on the striking great wheel (evidence remains where the lever was riveted to the arbor), but an off-centre disc was added to the locking wheel arbor to act as a heart cam with an extra detent added to the locking detent. This would have been an improvement on the original arrangement.

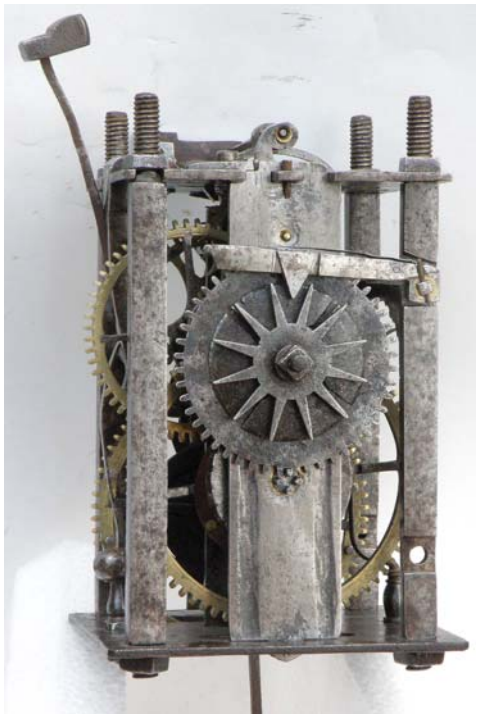
The under-dial view of a single-handed German table clock by Jeremias Pfaff of Augsburg about 1690 shows the nag's head, **Figures 6 & 7**. As the hand is adjustable the strike is let off by a twelve-pointed starwheel. Not only is the tip of the lifting piece spring loaded, but as virtually everything works in a horizontal plane where there is no gravity assistance, there is a plethora of springs. Anyone who has worked on one of these clocks, especially later versions with rack striking, repeating and an alarm, know that getting the correct tensions on the numerous springs can be tedious. Overlift is by the hammer-lifting pins, but the photographs taken of the movement do not show this clearly enough for inclusion here.

Figure 8 shows a small single-handed iron wall clock from the 18th century, possibly German, also with a starwheel. The nag's head is spring loaded. The overlift cam has one slot and so is a single heart. (The larger wheels of this clock have the very unusual feature of brass rims and teeth, but iron crossings. The author would be interested to have details of any other clock with wheels constructed in this manner.) Originally there was a passing strike at the half hour, the length of the lifting piece being such that it fell off the starwheel tips when then the hand indicated the half hour, rather than the usual hour.

A similar arrangement on a Friesian *stoelklok* of about 1800 is shown in **Figure**



6. Underdial view of a table clock by Jeremias Pfaff, Augsburg, about 1690. The arrangement at the top is to manually let off the strike. The detent below the centre is for the alarm.

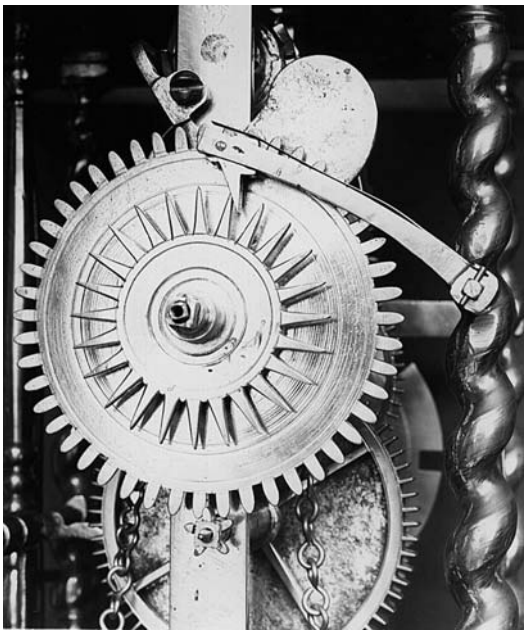


8. A small 30-hour iron wall clock, probably German, with nag's head striking let off by an iron starwheel. The hole in the right-hand pillar is for a missing half-hour passing strike.

9. This is also a single-handed clock, but as there is also a half-hour strike from the striking train, not just a passing strike, the starwheel has 24 points.

A wall clock with nag's head striking from Southern Germany, the Tirol or Switzerland, and dated 1748 is shown in **Figures 10 & 11**. This is a two-handed clock, but with the concentric minute hand shorter than the hour hand and indicating against a ring showing only quarters — a feature sometimes found on clocks from the Alpine regions, and even very occasionally on clocks with wooden movements. Being

7. The nag's head lifted by the starwheel.

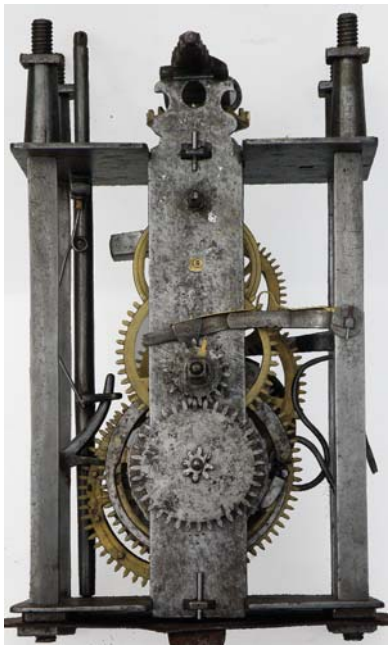


9. Friesian stoelklok, about 1800 with the nag's head lifted by a 24-pointed starwheel to strike the hours and half hours. (Photo: J. Arnfield).

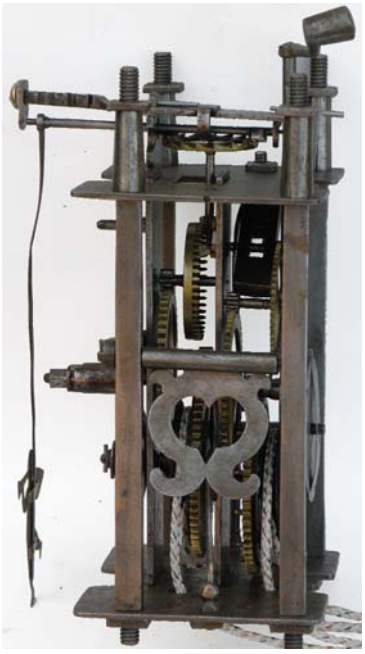
two-handed there is conventional motion-work and the strike is let off by a flag on the minute wheel. This flag is formed from an inserted brass tooth that extends rearwards.

The nag's head is returned by the usual light brass spring and the strike can be resynchronised with the hour hand by pressing a decorative spring loaded tab on the right-hand side. There does not appear to be a generally accepted term for this, but it is sometimes known as an *Auslösehebel* (trip lever) or *Auslöseflügel* (trip wing) in German, and a *hek* (gate) or *hag* (tab) in Dutch. It is a noticeable feature on Dutch Hague clocks as well as on horizontal table clocks, although on the latter there is no easy access to the movement from outside the case so it cannot be used to manually let off the strike unless there is a small hole for the insertion of a wire. The table clock in **Figures 6 & 7** has a small pivoted lever operated by a push button on the dial to manually move the lifting piece. On small clocks the whole of the strike arbor and its detents is returned by a spring rather than just relying on gravity, **Figure 12.**

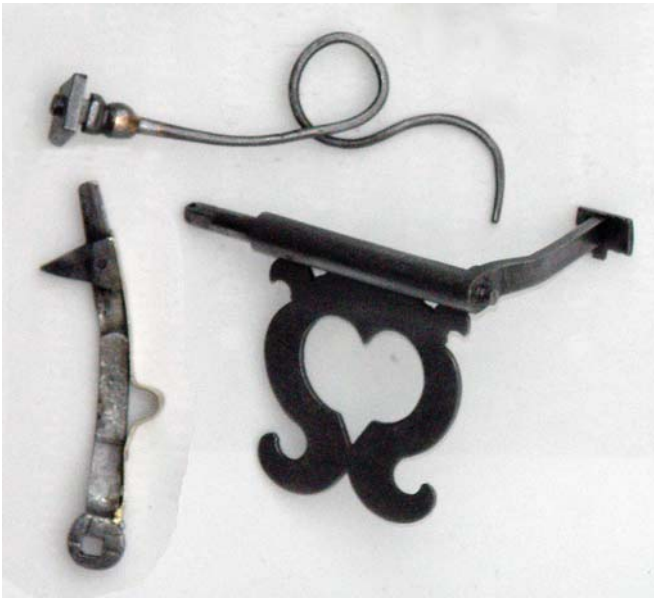
Instead of three separate arms at the rear end of the strike arbor these three functions are combined into one large flag, **Figure 13**. Locking occurs on the face of the flag with the overlift cam and the edge of the countwheel bearing on steps of different heights. When in the locked position the assembly



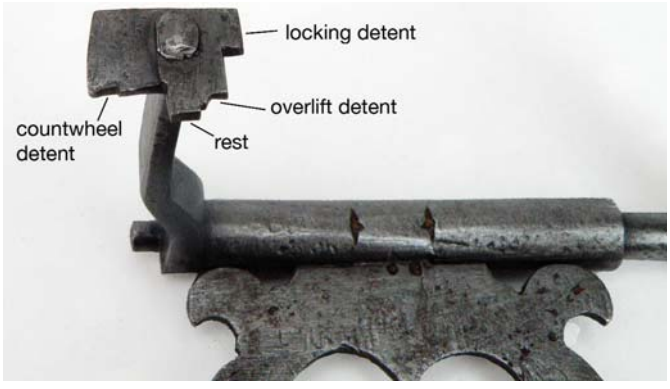
10. German/Tirol/Swiss iron wall clock dated 1748. Hour wheel removed to show the nag's head. Verge pallets and front pendulum also not shown.



11. Side view of complete movement showing the shaped piece to manually trip the strike.



12. The lifting piece and nag's head (left) fit onto the squared end of the arbor which has a shaped trip piece and combined detents. Above is the return spring.



13. Details of the combined locking, overlift and countwheel detents.

is prevented from falling further by another step on the flag resting on a notch in the rear movement bar. Overlift is by a double heart on the second wheel with locking on the third wheel **Figure 14**. The fly is very heavy, being $^{5}/_{16}$in (8mm) thick, typical of these clocks .

The striking train and countwheel showing the double heart on the arbor of the second wheel.

These example show that apart from the moving tip being returned either by gravity or a light spring and with overlift provided by one of three different methods (although a heart cam is the most commonly found), the basic arrangements are all very similar. Nag's head warnless striking is more reliable than is sometimes suggested.

References

1. Robey, J. Striking Without Warning, Part 1, *HJ* Sept 1999, pp294-5; Part 2, HJ Oct 1999, pp348-50.
2. Robey, J. A. *Antiquarian Horology*, (to be published), A Large European Iron Chamber Clock.