[The following is a transcription of the 'little black book, presumed to be by Woodhouse. It seems clear that it was written before the machine was modified to have solenoids etc.
I have omitted the list of settins for the various methods for the present, as these can easily be derived from current databases etc.
Bill Purvis, February 2018]

Woodhouse Ringing Machine

with double panel for splicing.

Principles

The machine will ring any method on from 2 to 8 bells. Bells change in pairs. Thus if 1 moves 2 must also. if 2 moves, so then 1 or 3 must move. There are therefore 7 pairs possible

1&2, 2&3, 3&4, 4&5, 5&6, 6&7, 7&8

Number them: 1 2 3 4 5 6 7

There are 7 flat bars (see later.) If no 1 rises 1x2 change, if 2 rises 2x3, and so on. If bars 1 3 5 7 rise then a row such as 12345678 will be changed to 21436587, if bars 2 4 6 rise the next change will be to 24163857. Thus any pairs can be made to changeby selecting the right bars.

Consider now the places made. Take Double Norwich, see next page. If 1st place and 4th place are made then bells in 2x3, 5x6, 7.8 mustc change so therefore bars 2 5 7 must rise. In this machine, to cause any place in any row to be made you have only to press down a peg, numbered 2, 4, +c, according to the place required (see later.)

Double Norwich	number of row	places	rising bars
13254768			
12345678	1	1 8	2 4 6
21436587	2	-	1 3 5 7
24135678	3	1 4	2 5 7
42316587	4	-	1 3 5 7
24361578	5	3 6	1 4 7
42635187	6	-	1 3 5 7
24365817	7	5 8	1 3 6
42638571	8	-	1 3 5 7
46283751	9	1 8	2 4 6
64827315	10	-	1 3 5 7
46287135	11	5 8	1 3 6
64821253	12	-	1 3 5 7
46812735	13	3 6	1 4 7
64187253	14	-	1 3 5 7
61482735	15	1 4	2 5 7
16847253	16	-	1 3 5 7
18674523	1	1 8	2 4 6

The FIRST CONTROL is to press down the places required. It will be seen that after 9th row the places are the same but backwards.

The panel containing the pegs can be made to reverse on

row	method	no of changes in a lead
6	Doubles	10
7	Plain Minor	12
8	Triples	14
9	Plain Major	16
13	TB Minor	24
17	TB Major	32

This is brought about by pegs on the panel in the [back?] row + numbered by the no of changes in a lead.

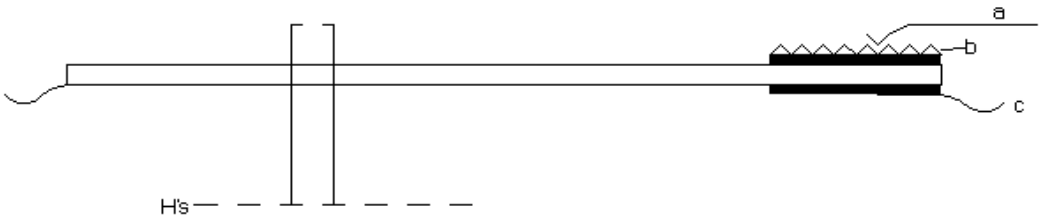
This is the SECOND CONTROL.

The actual ringing of the bells is done electrically.

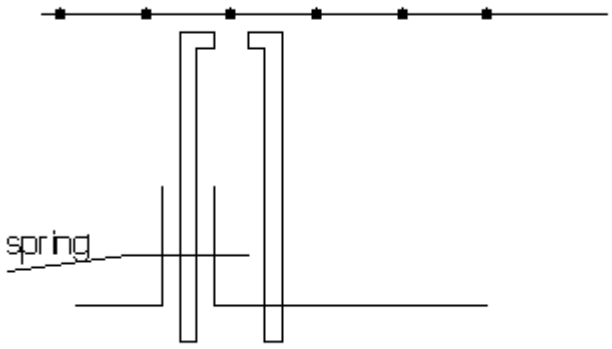
[p5]

The Machine

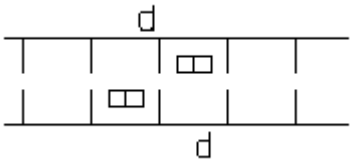
The “bells” consist of brass bars ½” wide:



At one end is a piece of plated brass in 8 notches(b). This is insulated from the body of the bell & connects through to the support c. A spring, a, presses on this and serves to convey current to the bell. There are two catches thus:



⅜ of an inch apart, one on one side of the bar and the other on the other.



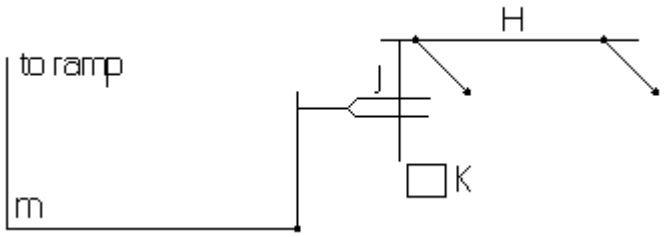
These are caught, when up, by bars with pegs on them, see d.

The catches are pushed up by 7 flat bars underneath & going across all the 8 bells. See H's in above fig [1].

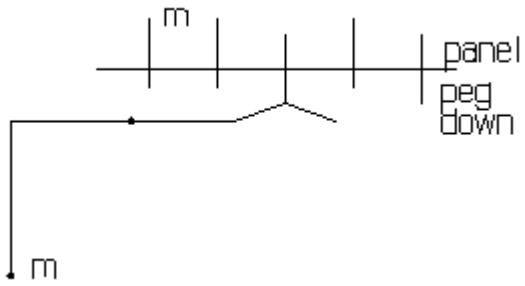
These H's are brought into action by ramps under the panel

[p 6]

thus:

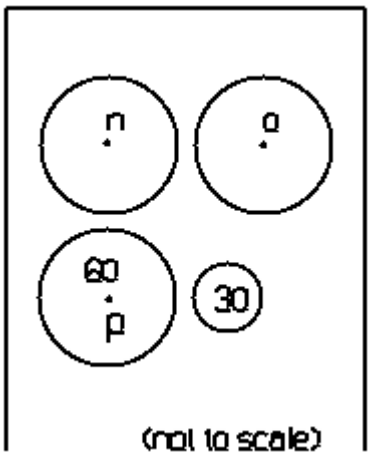


If a peg is down it will catch a ramp and raise the end, thus:



then the <u>end</u> of rod m will push the freely hanging j to the right so that it will be caught & lifted by k which is raised by a cam on one of the shafts.

The rods d are moved, the near one to left and far one to right by cams on 2 shafts, n & o.

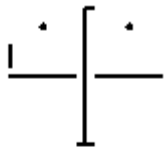


These are driven by a wheel on a third shaft p which in turn is driven by a 30 wheel on a shaft carrying a handle.

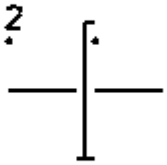
The object of 2 shafts n & o is to insure identical movement of the rods which must be synchronised so as to give good diagram drawing.

The sequence of events is:-

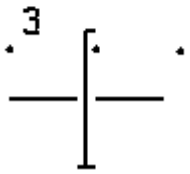
1. The panel moves and a peg or two press down ramp. These push j's & k rises and the catches rise.



2. The rods advance sufficiently to get under the projections on the catches.



3. K and therefore the H's drop.



4.Rods push bells forward fully.

5. Rods return slightly so as to drop the catches.

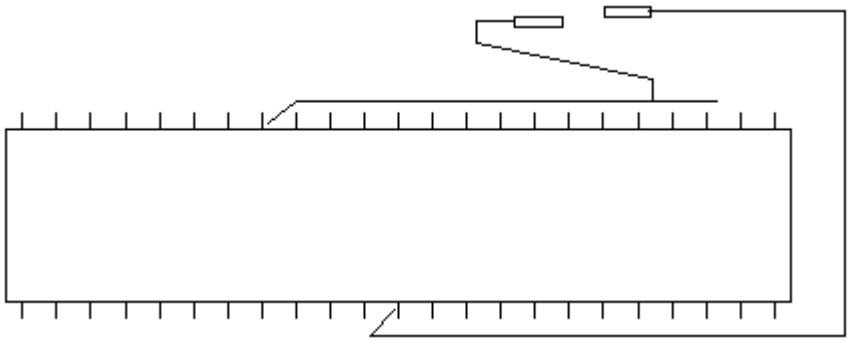
6. Rods return fully.

[p8]

These rods movements are brought about by the shape of the cams.

Panel Drive

2 cams, one on o and one on p push levers. The one on o pulls a pawl on the panel and drives it to the left. That on p pulls a lever, pivoted in the centre, which pulls a pawl and drives the panel to the right.



[p9]

Reversal of pawls brought about by star wheel, see below.

The two pawls are so held that they cannot be in at once.

--- fig 13 ---

When these are as shown the push pawl is in.

The star wheel has 5 teeth & only rotates when the pawls have to be changed.

--- fig 14 ---

As the star wheel turns a moves to the left and back. This reversal of the pawls is brought about by pegs on the panel, depressing a ramp which raises a rod under the 10 tooth wheel on the same shaft as the star wheel. A stud on this catches a tooth and pulls it on, then a moves either R or left & moves the pawls.

--- fig 15 ---

The rod e, of course, goes to right & back every rotation of the cam which drives it. This cam is on shaft p. It misses the tooth wheel except when raised by the peg on panel.This movement takes place after K has dropped. K is also worked by a cam on shaft p.

By taking hold of the hook f, depressing it slightly and pulling, the star wheel can be turned & either pawl set into engagement.

On letting go of f be certain that e has dropped out of engagement.

f need not be used, see p18 no 2.

The Panel

Consists of 33 rows of 7 pegs except for those that have an 8th peg for reversing the pawls which drive the panel. Along each side are pins ½" apart which the pawls drive.

The pegs are like this:

--- fig 16 ---

When pressed down they catch on the spring a & are released by flicking off the spring. The adjustment is by screwing in or out b & locking it with the fibre cylinder c which is numbered.

The lower half of each peg is squared.

The throw over pegs are numbered as the number of changes in a lead. Thus the 9th row is as show below:

--- fig 17 ---

If for instance you want 1st & 4th places making, you simply press down 1 & 4. If 3rd & 6th .... 3 & 5

5 does for both 5th & 6th

Rows	Double Norwich
1	1 8
2	-
3	1 4
4	-
5	3 6
6	-
7	5 8
8	-
9	1 8 16

The panel is in two halves

Left Right

32 - - - - - - - - - / - - - - - - - - - - 32

So it can be set for two methods at once e.g. Left Superlative, Right Yorkshire.

Start with Superlative & carry on to Yorkshire the leads run
S Y S Y S Y S.

So at end of course put down No 1 pawl key to get two S's running, & then knock it off. Or, while ringing one method, say on the left, you can prepare another on the right.

The panel is raised up about 4” above the base board & runs parallel with the bells.

--- fig 18 ---

It is easily lifted off.

Ringing gongs or bells.

The right hand ends of the bells runs over 8 insulated plates:

--- fig 19 ---

The are connected to the 8 contact points on the switch:

--- fig 20 ---

<< On turning the switch one way, the suds on it press the 8 springs into contact with 8 points. The other way 6 springs --- 6 points [obvious] >>

A plate made of insulating material has
16 contacts on one circle for 8 bells,
12 . . . . . inner circle for 6 bells.

--- fig 21 ---

There is a larger space between 1 & 16 and 1 & 12 than between the other contacts, that is to give open leads at handstroke.

A contact arm revolves over the studs, one end pressing on the outer circle & one on the inner.

These studs are connected to the points on the switch, the outer to the 8 & inner to the 6. Any bell therefore resting on the 1st bar will ring 1st.

The connections as on next page:

--- fig 22 ---

The setting of the contact wiper can easily be altered by setting the wheel on or back a tooth or so.

Diagram Drawing

A platform, easily detachable by undoing thumb screws, is fixed above the cam shaft and higher than the rods. This has two rollers at one end and a drum by a hook[??]

--- fig 23 ---

The paper is moved every time the rods move. An arm, attached to the 7th bell carries a pen.

--- fig 24 ---

<<To ring rounds. If an exact number is required set it on the panel opposite an even number, 4 will give 4 rounds, 6 will give 6.

Suppose you are using the Right side. Put now 4 opposite the arrow which shows which row is in operation, and put the near, or pull pawl in. See that throw over peg 1 is down.

Now pull back into a notch the little lever near the bells.

--- fig 25 ---

Start up & move lever away from you as soon as the panel arrives at No 1 row <u>& the H's have come up</u>.

<u>or</u>

You can put no 2 throw over & no 1 down as well. Out pawl on 2, pull pawl in. Pull back the rounds lever & it will ring rounds until further notice.

So that changes start as so as no 1 comes on, knock out no 2 throw over, & the round lever as before. >>

In starting be sure that you are on an even row (2 if you start without rounds) and see if the H's rise at once on turning the handle. <<if not you will get the open leads at backstroke.>> See over

6 bells

Put down lever on extreme left & set pegs for the back six.

[p18] **To work the machine**

1. Lead length pegs are on the far side of the panel, numbered according to the length of lead. Thus, put down 16 for Plain Major.
2. The panel is easily shifted & placed on any row. If against a pawl (e.g. if near pawl is in, you can't move it to the <<right>>left. The near pawl can be held out by a finger & the far pawl by pressing below the near pawl.
3. To change the pawls:
   If far pawl is in press on 2 Left
   If near pawl is in oress on 2 Right
   Turn, when pawls will reverse!
4. If far pawl is in set on 2R, use R side
   If near pawl is in set on 2L, use L side
   Turn handle slightly & see if H bars rise. If not, continue turning when panel will move to 3. Set it back to 2.
   Set lead length peg & be sure no others are up. Set the method according to this book. An old setting in any row is released by pressing the number head inwards (with the clicker out).
   Another way if starting:
5. If far pawl is in place on 2L
   If near pawl is in place on 2R
   Raise LH1.
   Turn till panel comes on to the other 2, Use this side. Set method & lead length pegs and put LH1 down.
6. For most triples and methods that start on 1, proceed exactly as in 5 but stop on 1. Set method & lead length. After one or two changes put LH1 down.
7. Plug in bells, switch on.
   See p 19 if anything goes wrong.
8. I generally use left side.
   Set near pawl and proceed as in 4. After doing a ½ diagram[?], push panel back to 2 left, turn till pawls reverse & you are ready for another method.

[p19]

If a jam occurs, stop at once. It will probably be found that a mistake has been made in setting (see p25) the pegs & consequently 2 adjacent Hs have risen.

Perhaps a peg wants adjusting (p24) Perhaps a peg has jumped up or not rising when clicker is pushed. Turn handle slowly backward till the catches free themselves and drop.

When splicing set one method R & the next L. Release the far peg on 1 when the second method is wanted.

If the setting has to be altered, start altering as soon as the treble has left behind, following it up. It is best to make out a table before starting. See pp 102, 103.

7. Bobs & Singles, simply alter the setting of no 1 row as required.

8. If a change course occurs, it means a H has missed rising, see 6, when a mistake in setting or peg wants adjusting.

[p20]

<u>To draw a diagram (½ a course)</u>

Proceed as on previous page.

If second place is at lead end set the bells 17856342

I 8th place, set 14263857.

Thus you will get a diagram of the 2nds work or 8th work.

A ½ diagram (3½ leads) is generally enough to suit.

See that the hook that pulls on the paper is working right.

It is best to weight the end of the paper by a paper clip:

--- fig 26 ---

The hook is easily put out of action when not weanted, just turn its sides a bit.

--- fig 26 ---

[p21]

<u>Other faults that may occur</u>

If two adjacent H's rise see p 24. If the driving[?] suddenly seems light, a pawl may have missed moving the panel, owing to not coming out far enough.

--- fig 27 ---

The pawl may be adjusted by screw & lock nut or perhaps the screw on the cam that operates it can be screwed out a bit & so give a longer travel.

Occasionally it has happened that when the reverse should take place both pawls are in & so no movement is possible. The reason is the same as above, more travel is required for one of them.

Sometimes, but rarely, a catch sticks up. Take out bell, clean. This is shown if a bell suddenly gets wrong.

The screw controlling the writing[??] lever sometimes works loose. Be certain when changing a screw that the old setting plunger[??] jumps[??] out.

--- fig 28 ---

[p22]

The screw on the handle shat sometimes works loose.

--- fig29 ---

The shaft has a flat on it here. This generally throws the ringing out. This is adjusted thus: Remove panel, Loosen screw A and slide it & wheel B out of engagement with motion wheel C. Then turn B so that it is nearly on the first stud directly the pawl shift has taken place.

[p23]

Notes

<<It occurs to me that the H bars could drive the bells directly & do away with all the rods and catches.

One method would be to use Carter's idea:

--- fig 30 ---

Another is this:

--- fig 31 ---

During the war & lack of material I have only been able to try them roughly. They both seem to require great accuracy, whereas my method as described in this book only requires the accuracy to turn a 4BA screw.

See p 126

[p24]
Adjusting peg action

No 1	pushes	1+3 out, 2+4 on	Blue
2	- - -	1 out	Grey
3	- - -	3 out, 4 on	Green
4	- - -	4 on	Yellow
5 or 6	- - -	5 out	Orange
7	- - -	7 out	Brown
8	- - -	5+7 out, 6 on	White

Suppose you have set 1 8, 2 4 6 H's should rise. Perhaps two adjacent ones come up.

Press on No 1, see if it's right
- - - - - - No 8, - - - - - - - - - -
--- fig 32 ---
Screw out slightly the peg indicated.
Best to loosen number first as it acts as a lock nut. Then set by slightly turning the handle, & lock.

BELLS

No 1	Red	No 5	Brown
No 2	Green	No 6	Orange
No 3	Blue	No 7	Grey
No 4	Yellow	No 8	White

[p25]

Places set	rise
none	1 3 5 7
1 8	246
1 4	2 5 7
1 6 (5)	2 4 7
2	3 5 7
7	135
3 6 (5)	1 4 7
3 8	1 4 6
3 4	1 5 7
5 6	1 3 7
5 8	1 3 6

The diagrams have been reduced to ½ the scale by placing a 60 tooth wheel instead of the 30 & putting the pen on the far holder.

--- fig 33 ---

[p 126]
[experimental trials]
H bars driving bells
--- fig 34 ---
<u>One side shown only</u>
1st result of a rising pushes b into engagement. Further push rotates wheel and moves bell.
This works, but requires extreme accuracy to make them move exactly the same.
No rods or catches required.
The H bars, however, must be like this:
--- fig 35 ---

[p 127]
A machine was constructed for the purpose of drawing diagrams for 9, 10, 11 & 12 bells.
The construction was the same as before except for catches.
--- fig 36 ---