BY....I.E.S.....DATE 4/8/55 SUBJECT....."Franken" the Mouse..... SHEET NO. 1 OF 4..
CHKD. BY.....DATE..... JOB NO.....

Suggestions for building a second and improved model based on experience in the development of the present model, as designed and constructed by Ivan E. Sutherland.

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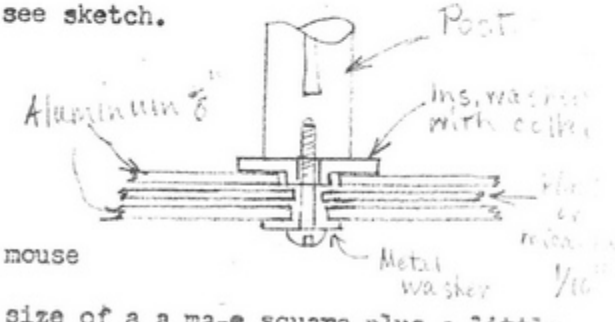
1. The present box has been found to be somewhat small as there is not enough margin space for the carriage to move freely to the outer squares. With a maze of 8 x 4 squares each 4" by 4", it is suggested that the box have inside dimensions of 25" x 43" x 11" deep approx. (the present box is about 22" by 40" inside)

2. There should be a false bottom about 5" from the top. This false bottom would rest on an aluminum angle bracket around the sides. It would probably best be made of sturdy plywood, in several pieces, for ease in removal. The object of the false bottom is to leave the top section free of motors, relays etc which in the present model are apt to foul the cable connecting to the magnet carriage. The cable from the magnet carriage could have a plug at the end which would plug into a socket fixed to a permanent support across the box at the level of the false bottom.

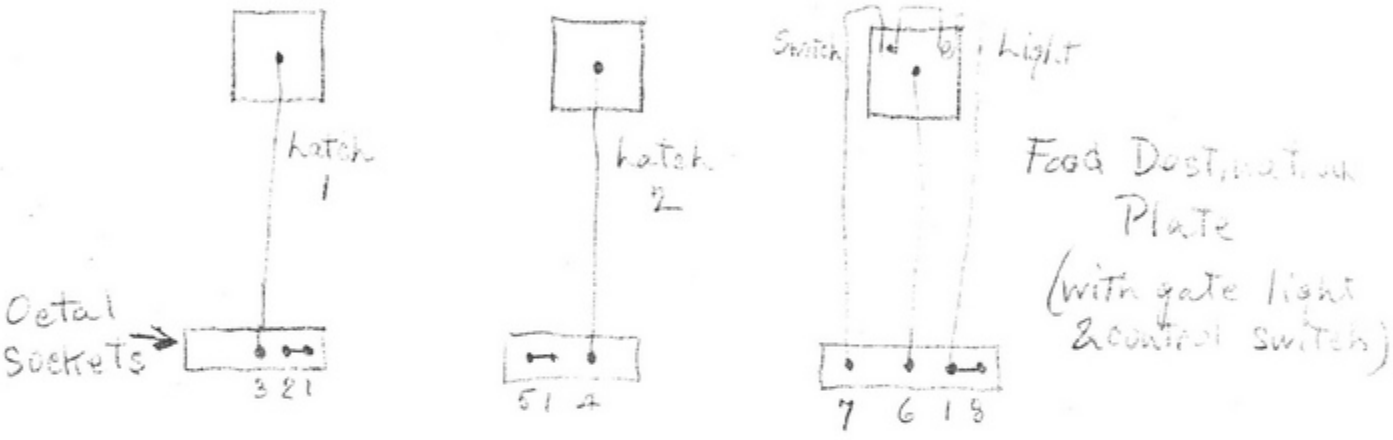
3. The aluminum top of the box, constituting the maze, should be made of a sandwich sheet of aluminum with insulating material between. The lower aluminum sheet should be slightly smaller than the upper, so that the piano hinge does not connect the two. For detail of fixing posts see sketch.



4. The plates representing the destination of the mouse should be made of an insulating material, the size of a a maze square plus a little margin, and be attachable to the tops of four posts. This can be done by means of suitable spring clips, or by four banana plugs fitting into holes drilled in the top of the posts. The destination plate will have a light springy wire whisker stretching down from its center, and the mouse will have a metal plate on his back. A flexible wire from the destination plate whisker will lead to the proper circuit. This arrangement is better than the

4. (cont'd) previous one which employed four plugs at the corners of the squares, wired underneath the top plate, and in which the wires were apt to foul with the magnet carriage.

The latch destination plates have a single wire connected to an individual pin in an octal plug, and the food destination plate will have 3 wires (see diagrams). The short circuiting of two pins of the plugs tells which destinations are in use. The three (or more if needed for convenience) octal sockets will have similar numbered connections connected in parallel, so that it will not matter which socket any plug is plugged into.

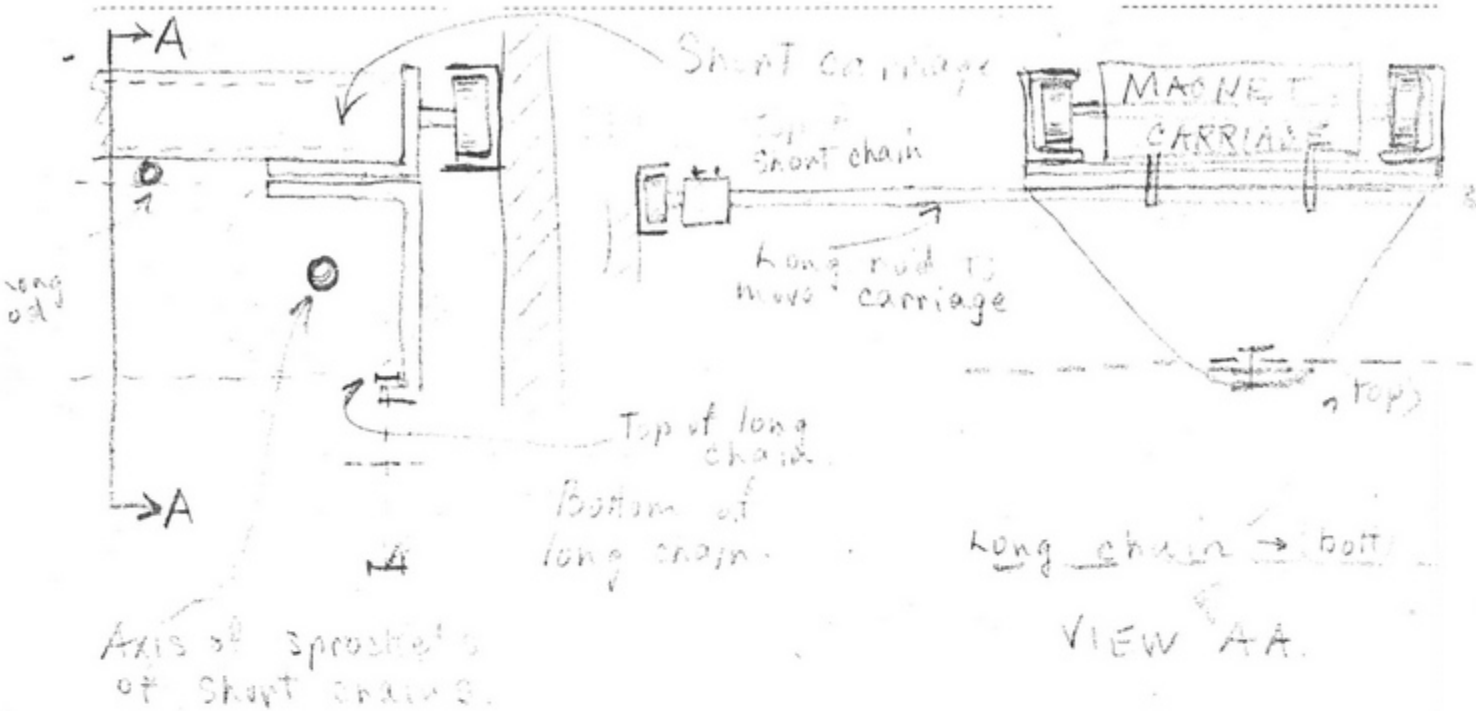


5. The magnet carriage can be similar to the present one, but should have ball bearing wheels running in shallower channels. The magnet cable can hang from the center of the carriage, possibly by means of a spring guide like those used on an electric iron etc. At the end of the cable will be a male plug, 4 prong.

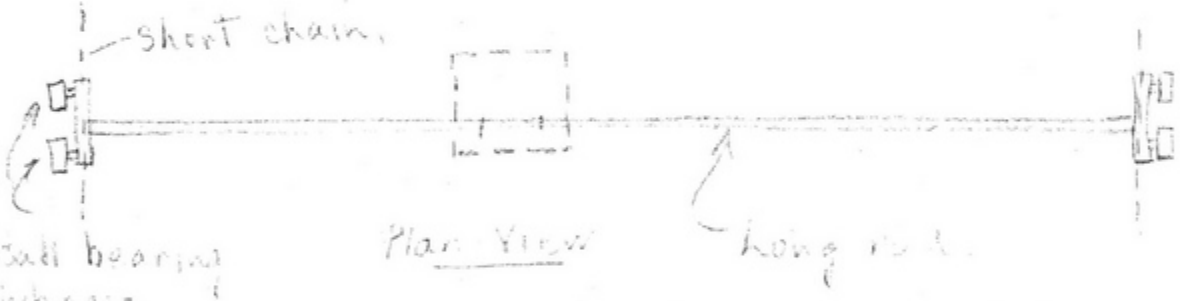
6. The longwise carriage will have ball bearing wheels and will be made of shallower channel to accommodate the magnet carriage wheels.

7. The longwise (E-W) drive chains should be lowered , because the drive can quite well be a little distance below the carriage, which is relatively rigid. The motion from the chain will be transmitted by triangular brackets attached to the end of the carriage. See sketch. on next page.

8. The short drive chains should be raised up, so as to drive the N-S drive bar almost directly. see sketch on next page.



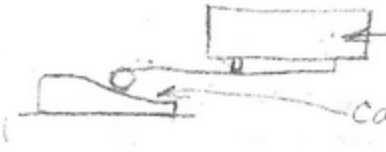
Above sketch applies to par. 7.



This sketch applies to pars 8. & 9.

9. The N-S bar or long bar which moves the magnet carriage should have two ball bearing wheels at each end running in suitable channels. see sketch above. Possibly one ball bearing wheel at each end of the long bar would be adequate and simpler.

10. Micro switches to be set up at the ends of travel, in such a way that the micro switch is operated by a cam action rather than a direct push. This allows more accurate adjustment, and avoids ruining the switch if the carriage should overrun.



11. The possibility of embedding the four magnets on the carriage in solid plastic can be contemplated. The disadvantage is that the heat radiation would be rather poor and the magnets might heat up. This could be found by experimenting with one magnet before trying it.

12. Instead of the sliding switch arrangement presently used to indicate the position of the carriage, it is much better to use rotary switches driven by a small auxiliary sprocket from the respective drive shafts.. With proper gearing the rotary switch could be mounted directly on the motor reducing gear.

13. One rotary switch (about ten positions, must be an even number) for each direction of motion. This switch will rotate once for each turn of the drive shaft, thus will come to the same position at the center of each square.

14. Another rotary switch for each direction of motion, the north-south one being 4 positions, and the east-west one 8 positions. These need not be continuous rotation switches, but should be geared so that thex positions correspond to the square centers.

15. The switch mentioned in (13) serves for center square contact, change square contact, and homing circuit mentioned later.

16. The false bottom will be removable, possibly in two or more portions. Above the false bottom will only the drive devices, the limit switches and the wires from the top and bottom plates of the top sandwich sheet (see par 3)
Below the false bottom will be the motors, rotary switches, relays etc. The drive chains will pierce the false bottom, connecting the motors to the axes of the sprockets which drive the traversing chains shown on page 3.

17. The motors and gearing can be located at one end of the lower compartment. The brain could be on a drawer which occupies part of the remaining space in the bottom, and which can be pulled out for inspection or servicing.

18. The homing circuit previously mentioned should act as follows: When the carriage is slightly off center of a square in any direction, the circuit will tend to center it.