

"Rainbow"

A. M. ATTON, A.M.I.E.E.,
describes the R/C "Film Star"

ROBOTS, especially those operated by radio control have a special fascination. When A. M. Atton was called upon to produce "Rainbow", a radio controlled doll for a children's film series, it must have been a pleasantly lighthearted task, for the doll was created specially for the star role and took about two months' work before being taken on location in Lausanne, amid the beautiful mountain country of Switzerland.

The design specification was originally drawn up for the following controls; walking in any direction, moving the arms, shaking and nodding the head and moving the eyes from side to side. The latter two controls were not perfected but the linkages were built in and locked.

Unlike our own R/C versions of the *Model Maker Plans Service* "Mr. Robotham" who walks on his own two feet, "Rainbow" is propelled by a motorised trolley on his right hand side which is disguised as a knapsack which he "carries" wherever he goes. This contains all the radio gear and batteries, is provided with a 1/60th h.p. motor driving a pair of wheels and a steering servo connected to the front steerable wheel. A 12 Ah. lead acid accumulator provides the power supply for all the motors.

The most difficult part of the design was to obtain sufficient power from the



six other miniature one watt electric motors which power the steering servo and move the limbs. All up weight of the doll and knapsack is 30 lb. which with a height of only two feet, represents quite a high density piece of engineering. The body, which is hollowed for the limb mechanism, and arms of the doll were carved from wood by a skilled pattern maker. Legs, head and feet are moulded rubber.

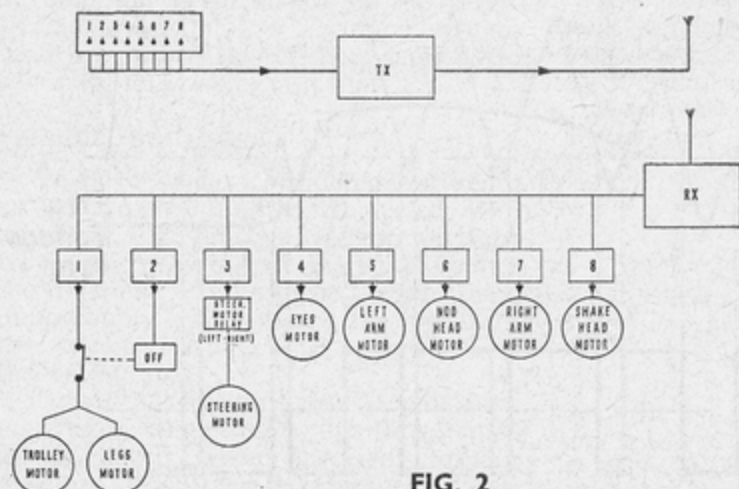


FIG. 2

Heading picture shows "rainbow" in full stride. The weight of the batteries and control gear in the trolley on his right is sufficient to maintain balance and keep the feet just clear of the ground.

Operation

Both legs are driven by a single motor via a gearbox and opposed cranks which impart a reciprocating motion to the legs. Lever extensions of which project above the hip joint. The feet do not actually touch the ground when in motion, the whole weight of the doll being carried by the trolley unit.

Each arm is provided with a separate motor employing a similar transmission system to the legs; the forearms are jointed at the elbows and have a lever system which is designed to impart a cyclic motion so that the forearm first follows the swing of the upper arm, then as the angle increases, causes the elbow to bend and the forearm to lead as the arm comes up. Fig. 1 shows the installation details.

Control

Conventional 8 channel 27 mc/s R/C gear is used for the guidance link. Channels 1 and 2 are used for on/off of the main driving and leg motors; channel 1 starts the motors which are maintained in the selected state by a hold on relay until the operation of channel 2 trips this relay, stopping the motors until channel 1 is operated again. Channel 3 is used for steering via a change over relay which provides for reversal of the steering motor (presumably channel 3 is pulsed proportionally). Channels 5 and 7 operate left and right arms respectively. Channel 4 was allocated to the eye movement, channel 6 to the head nodding motor and channel 8 to the head shaking motor. (Fig. 2 shows the control block diagram).

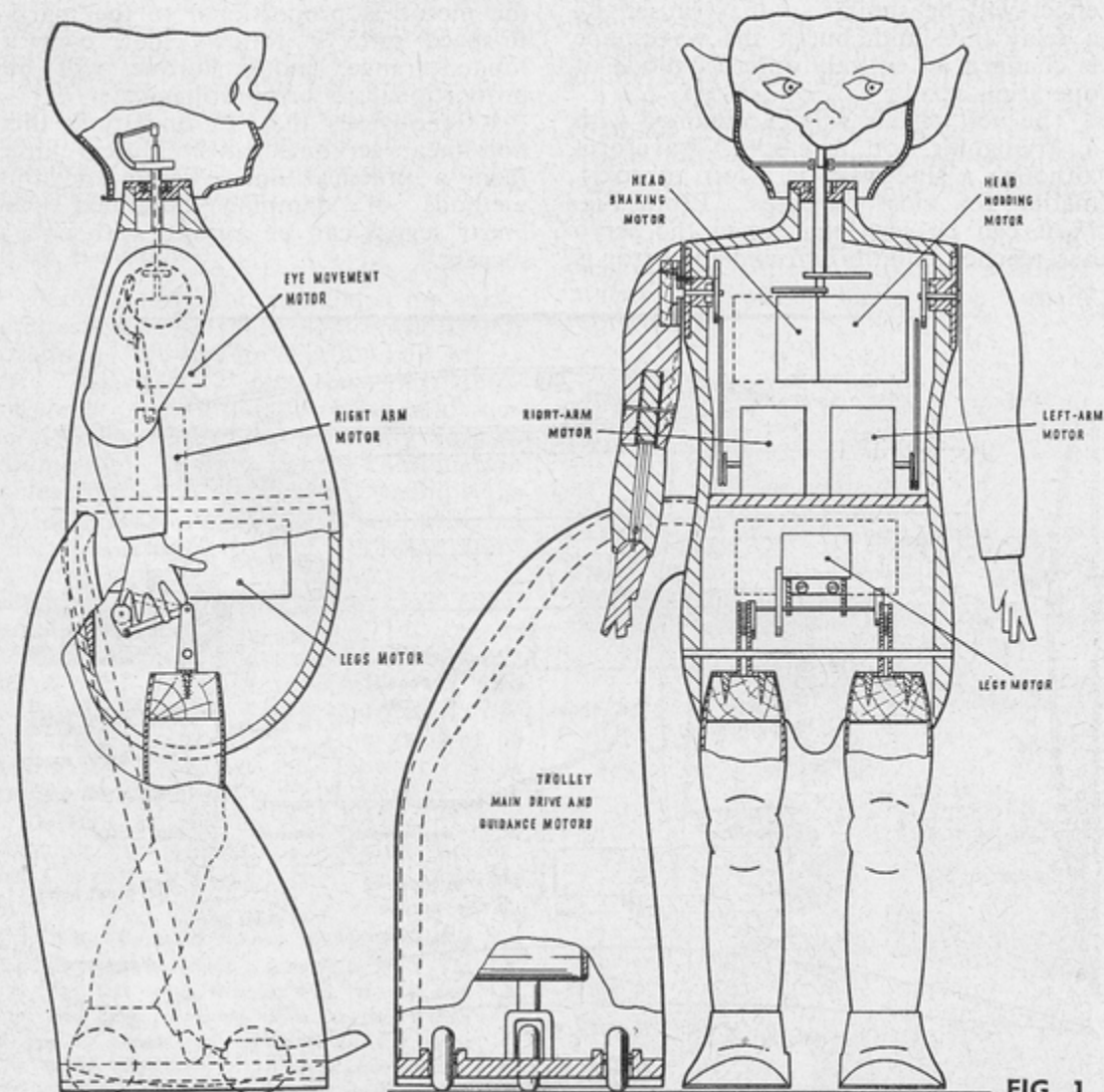


FIG. 1

The designer used experience gained in the design of the radio controlled lawn mower control gear which was exhibited at the Chelsea Flower Show in May, 1959 (*see R.C.M. & E. September, 1960*) to overcome the more complex problems which arose in the work on "Rainbow" and wishes to place on record the fact that "Rainbow" himself is owned by Miss Honora Plesch, whose

brain child he is. She also designed and made his face, hands and legs from moulded rubber. In addition, valuable help was received in construction and wiring from D. N. Beaney and V. D. Brooker.

We are indebted to the Journal of the Institution of Electrical Engineers from which we obtained the information.
