The analogue Chronalog

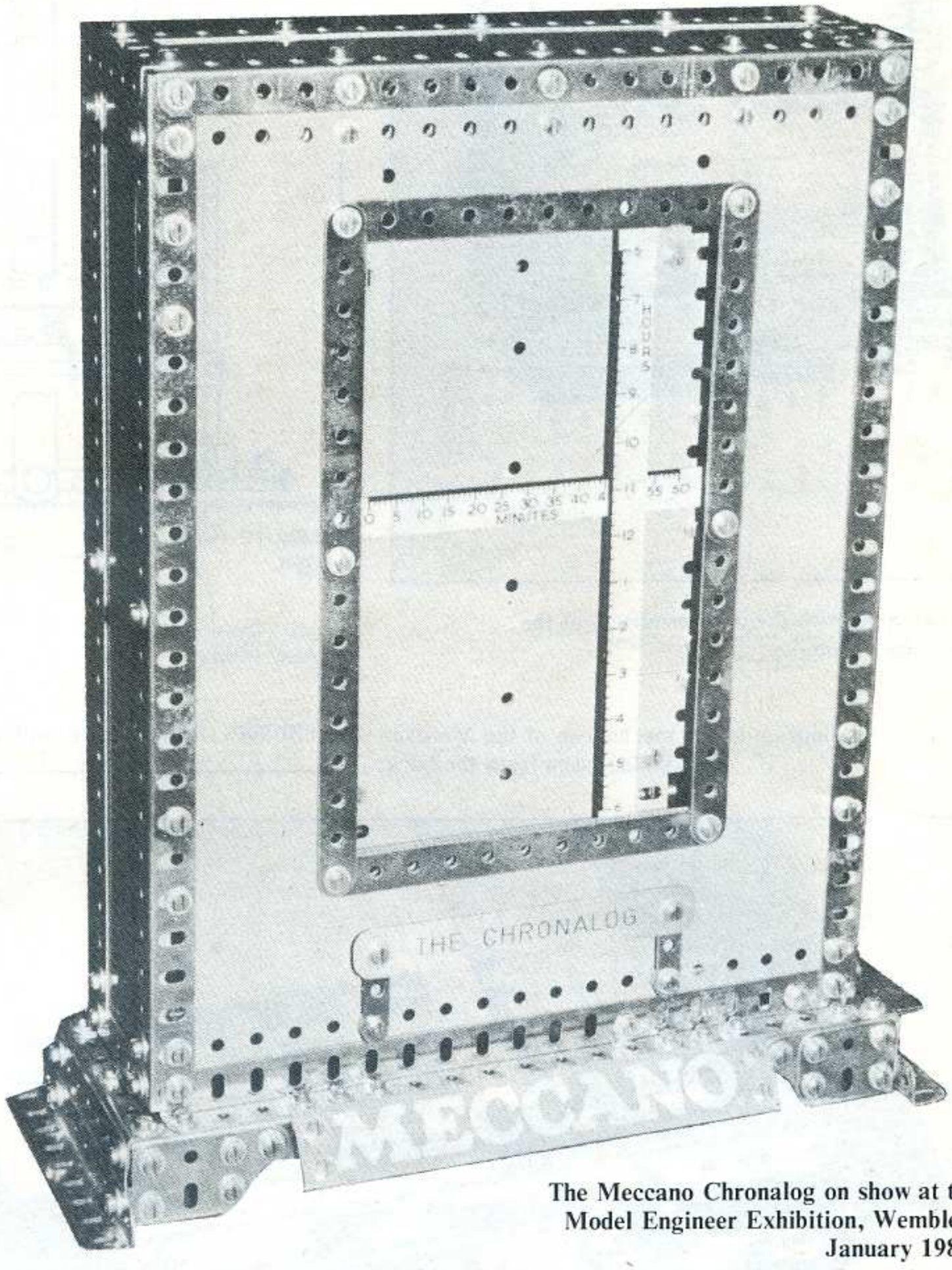
Noel C Ta'Bois describes a new concept in analogue time display.

A TOTALLY new concept in analogue, as opposed to digital, time presentation has been invented and patented by James Goodchild of the Furniture/Interior/Product Design Department at the Glasgow School of Art. Known originally as the Rectangular Clock it is now marketed by Intec Project Engineering Ltd of Redditch under the trade name of the Chronalog, derived from 'analogue chronometer'. It is intended for use in public places where its aesthetic qualities offer the architect or interior designer a new and functional display feature.

As its name implies, the clock has a rectangular face. This is traversed from top to bottom in 12 hours by a straight horizontal hour hand and from left to right in one hour by a straight vertical minute hand. The hour hand is marked in minutes, the minute hand in hours and the time is indicated at their intersection. The hands are printed on endless bands of transparent plastic film, passing round horizontal and vertical rollers having teeth which engage in perforations along the bands' edges. One band turns wholly within the other and each is driven by a separate synchronous electric motor through reduction gearing. The bands are illuminated from behind and, in addition to the hands, can carry decorative designs such as dots or moiré-fringe patterns or advertising.

The aspect ratio of the face can be specified by the architect and is determined by the relative speeds of the two hands. If the hour hand moves at 1/12th of the speed of the minute hand the face will be square, but if it moves at, say, 1/6th of the speed of the minute hand the face will be twice as high as it is broad. Experience has shown that for optimum analogue characteristics the aspect ratio should not be less than about 1.75:1 and that better results are obtained if it is increased, possibly up to as much as 2:1.

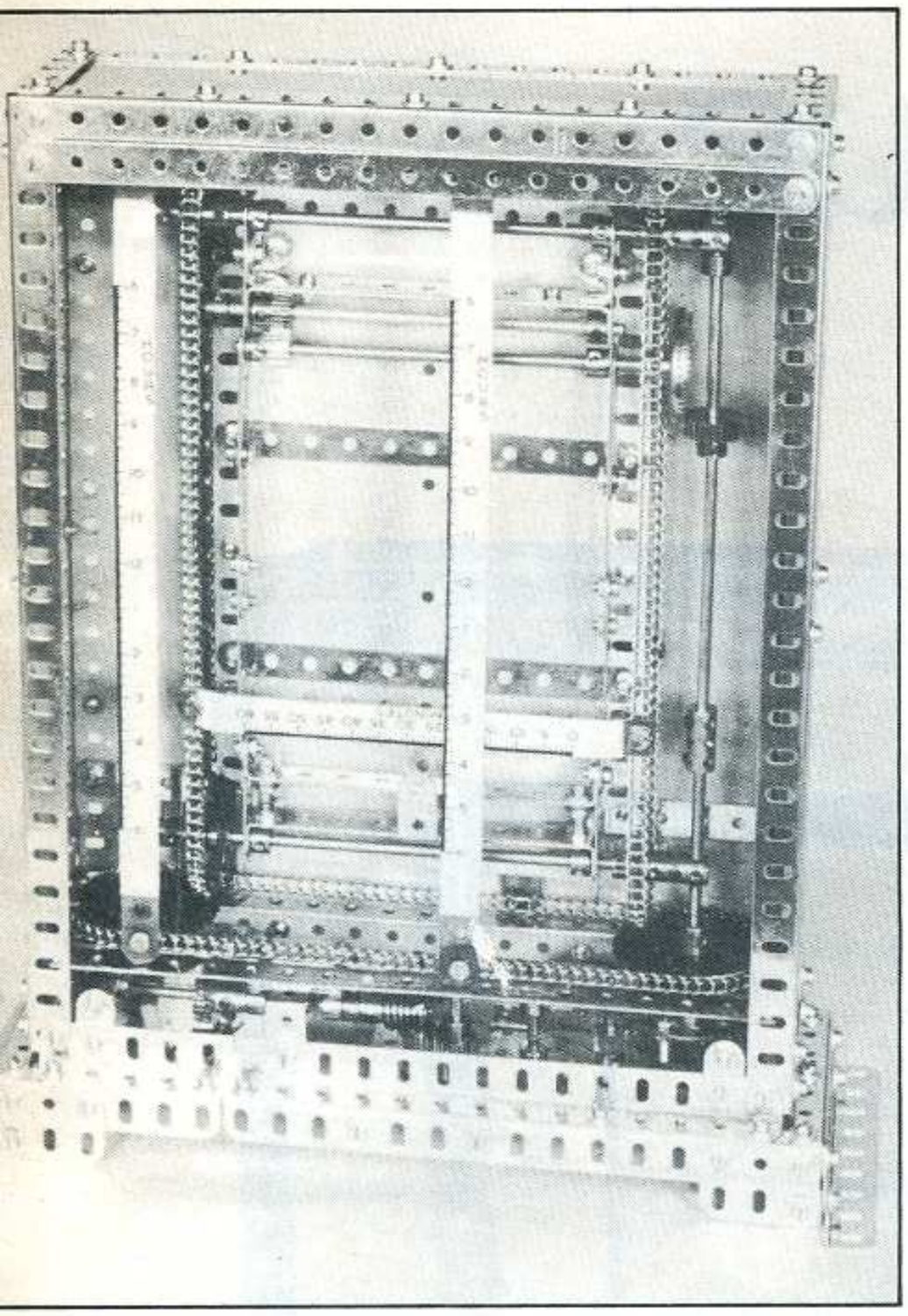
Many advantages are claimed for this novel method of time indication amongst which are that the minutes are correctly numbered (the five minute point is not labelled '1', ten minutes is not labelled '2' etc) and that the hands at no time eclipse each other as they do in a conventional clock approximately every 65 minutes. Admittedly there may be slight interference where the two hands cross but this can be overcome by printing the hours in a fixed position down the left side of the face while the minutes are shown along the hour hand as before.



The Meccano Chronalog on show at the Model Engineer Exhibition, Wembley, January 1983.

The Meccano model, built by the writer with kind permission from Mr Goodchild, was shown in the clock section of Model Engineer Exhibition at Wembley a few years ago. Meccano was chosen in order to produce a working model of this fascinating new clock design in the shortest possible time. Unfortunately the clock was not working because no mains socket was available on the clock stand.

Unlike the prototype, the hands are metal strips covered with paper on which the minutes and hours are marked. The strips are carried on pairs of chain loops, each loop being spring loaded to keep it taut. So that one pair can turn wholly within the other pair, the minute hand sprockets are larger than those for the hour hands. There are three minute hands and ▷



A rear view, with the back removed, of the Meccano Chronalog.

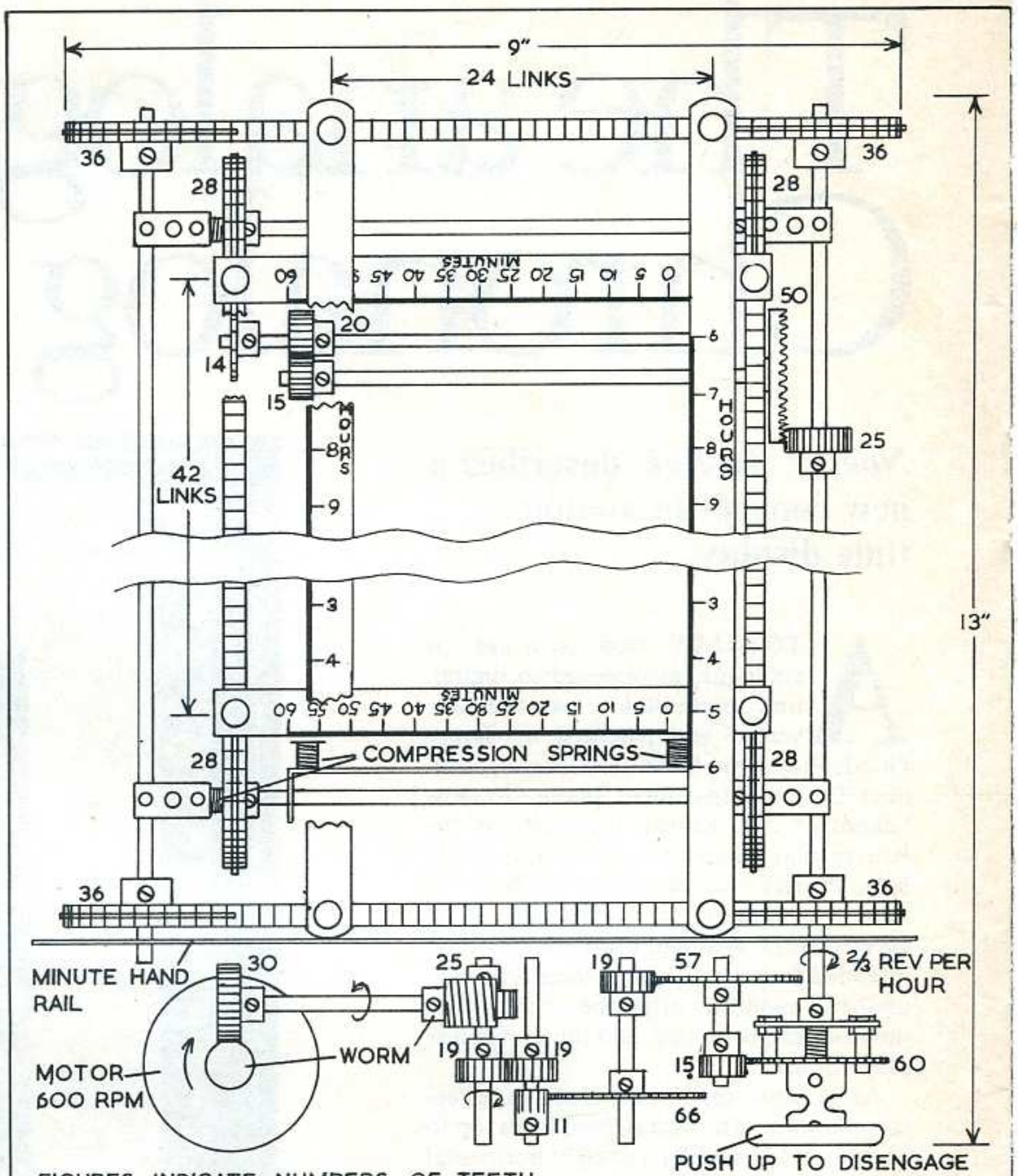
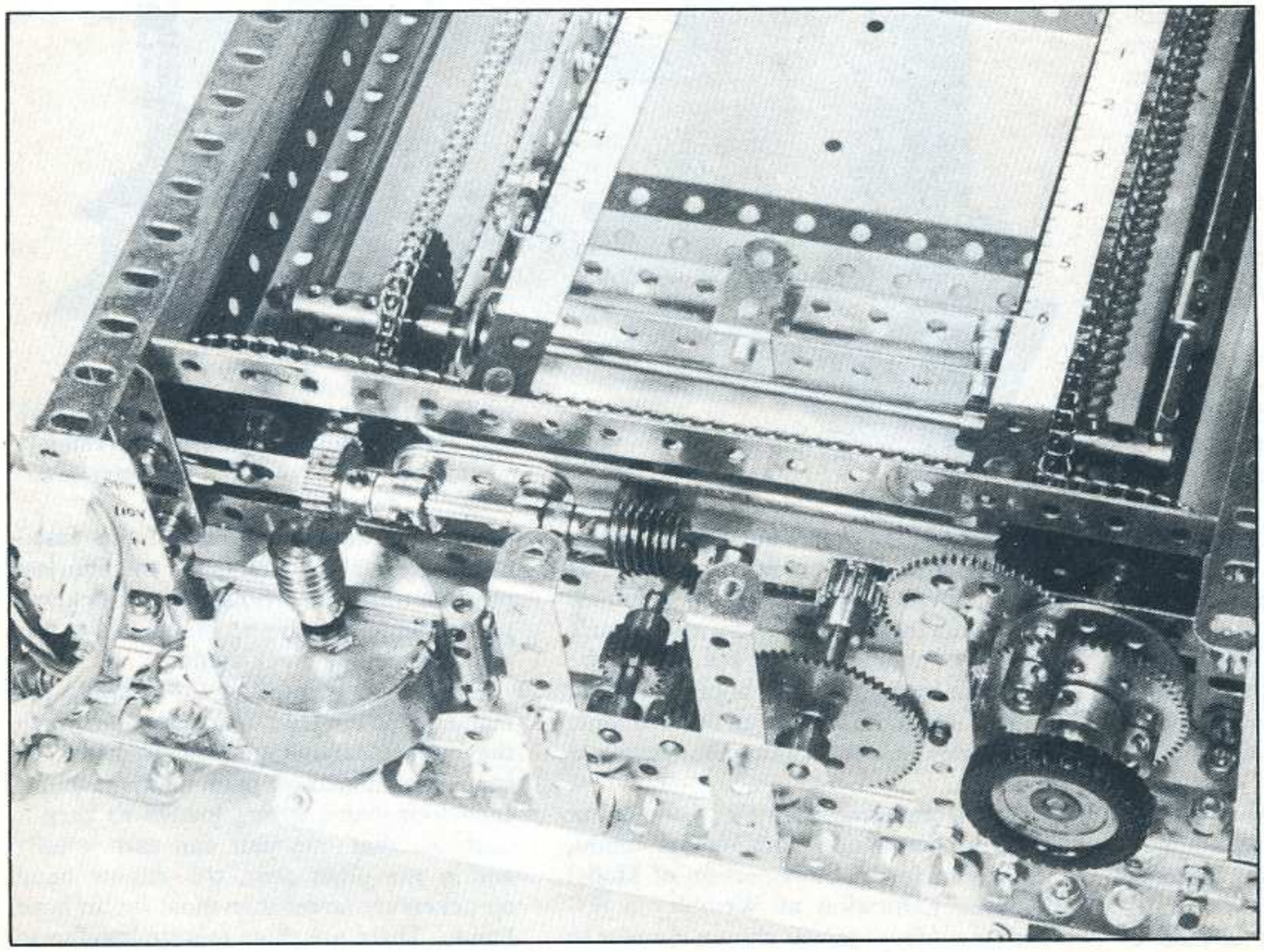
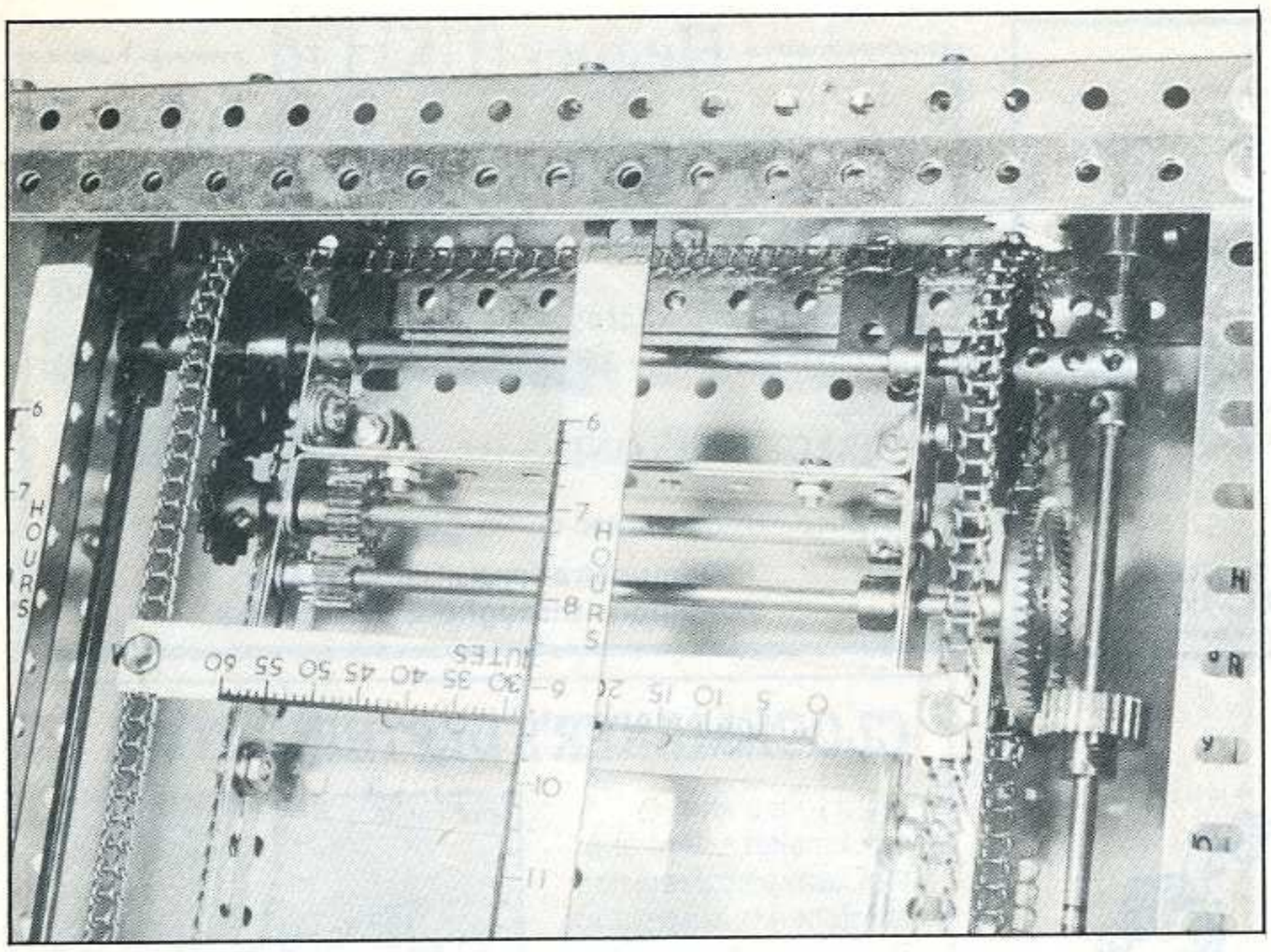


Diagram of the mechanism of the Meccano Chronalog, seen from the back.



Base of the clock with rear girders removed to show the synchronous electric motor (left), gear reduction train, and clutch mechanism (right).



View showing the attachment of the hour and minute hands to the chain loops, the hour and minute hand sprockets, the compression springs to keep the chain taut and the rails (strips) on which the minute hands run.

five hour hands which are so spaced that as one hand disappears behind an edge of the dial aperture another hand appears at the opposite edge.

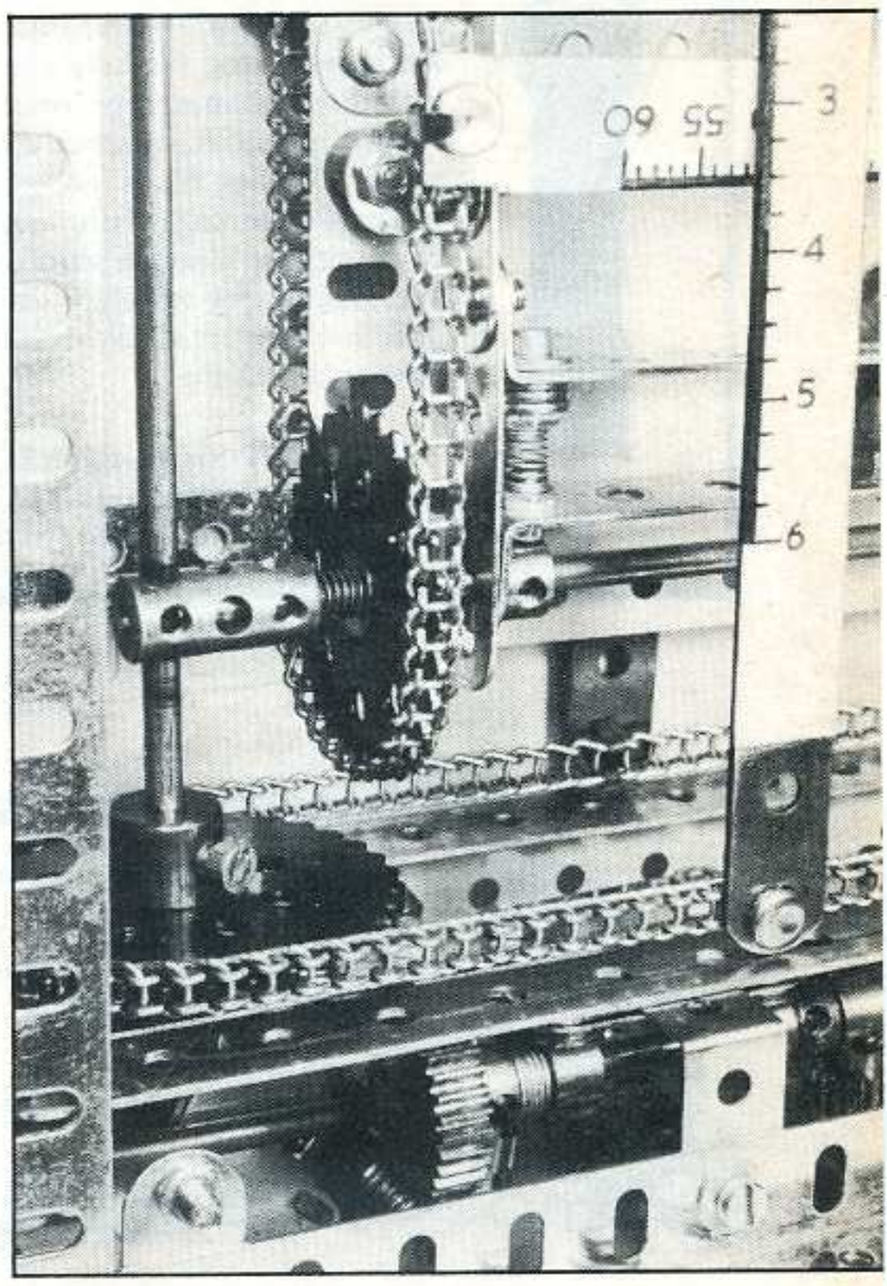
Only one synchronous electric motor is used. It is concealed in the base and drives the minute hand sprockets through reduction gearing which incorporates a clutch mechanism to allow the time to be adjusted. In the real clock this function is catered for by friction drives and hidden by easily accessible knobs. Further reduction gearing, within the chain loops, drives the hour hand sprockets. The ratio of this gearing, the sprocket wheel sizes and the spacing between the hands all determine the aspect ratio of the face. The formula relating to these variable factors is

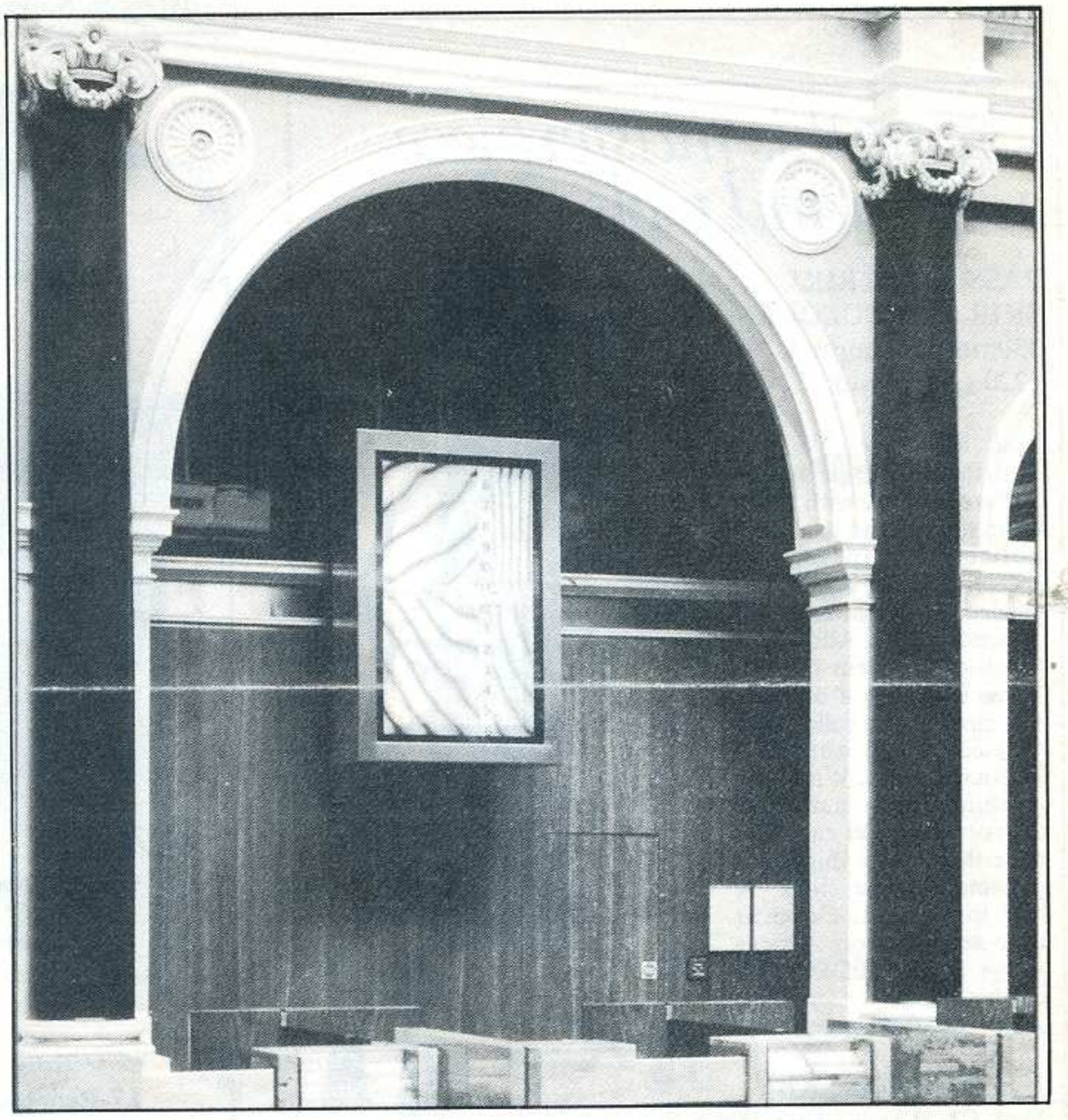
$$R = \frac{LM}{TM} \times \frac{TH}{LH} \times 12$$

Where R is the reduction ratio between the minute and hour hand sprocket shafts, LM and LH are the numbers of chain links between adjacent pairs of minute and hour hands respectively, and TM and TH are the numbers of teeth on the minute and hour hand sprockets respectively. The speed of the minute hand sprocket shaft, in revolutions an hour, is calculated by dividing the number of links between adjacent minute hands by the number of teeth on the minute hand sprockets.

Apart from the electric motor the only major non-Meccano part in the clock is the name plate which is a silvered and lacquered brass plate with wax filled engraved letters, fashioned by using recognised horological techniques. The Meccano model, while it illustrates the principles of the Chronalog, cannot possibly do justice to the design possibilities available in the real thing, an example of which is to be seen at the Head Office of Clydesdale Bank in Glasgow. □

Reduction gearing between minute-hand and hour-hand sprocket shafts.





The Chronalog at Clydesdale Bank, Glasgow.