From a...

to an...

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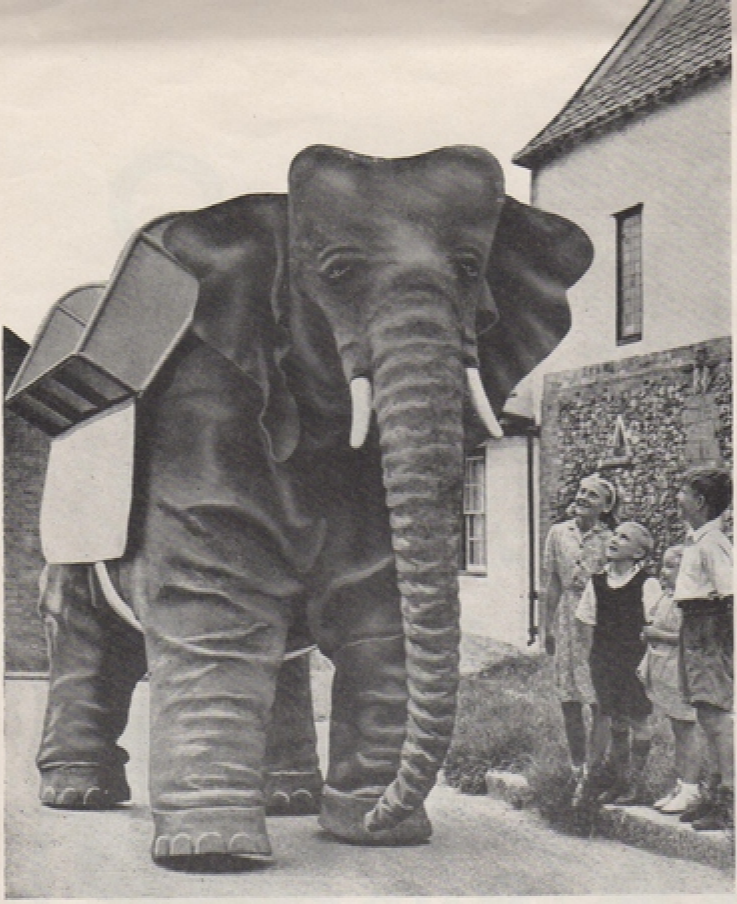


FROM A PIN TO AN ELEPHANT

By T. J. PALMER, A.M.Inst.W.

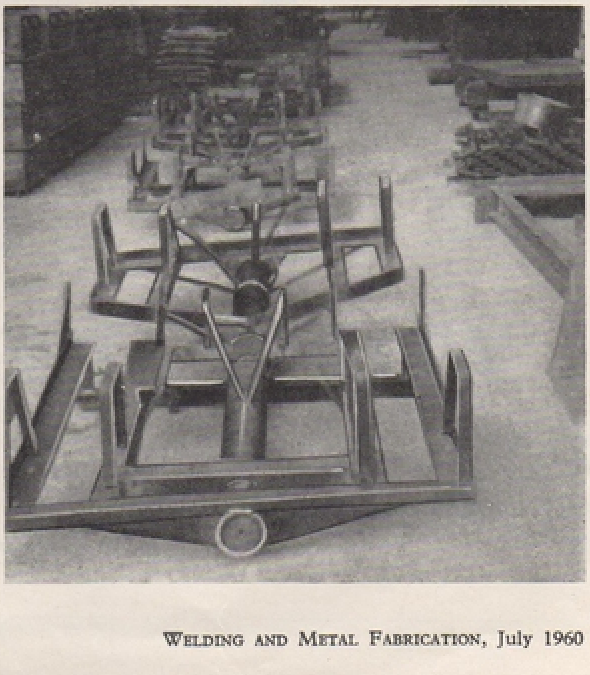
One of the "fabricated" mechanical elephants.

WITH a wide range of metal sections to draw from, and with modern cutting, plate-forming, manipulating and welding equipment, the enterprising engineer may create fabricated end products of infinitely varied shape and purpose. Indeed, there would seem to be no indication of any ceiling to the scope and flexibility of the process and it is often with some pride that a firm, in an effort to indicate its versatility, may make quite extraordinary claims. One such firm, W. A. Hunwicks & Co., Ltd., Harrison Works, Halstead, Essex, recently claimed to be able to make "anything from a pin to an elephant", but on investigating it was found that they could do, and had in fact done, just that. A "pin" in engineering parlance, ties up, of course; all sorts of roller pins, cotters, clevis pins and the like, being simple enough to make, but an elephant—well, that's another matter! But they did it, as our heading illustration shows, and this full-sized, lifelike, pachyderm, weighing over half-a-ton and able to carry eight adults and four children, was of fabricated construction, involved 9,000 parts, cost £1,500 and was propelled by an 8 h.p. Ford water-cooled petrol engine with a four-speed gearbox giving a walking speed of from two to 12 miles an hour.

A number of these elephants was made to the design of Mr. Frank Stuart, a theatrical mask-maker, and it "caught on" in various countries including the U.S.A., being backed by the Board of Trade as a potential dollar earner. The frame was of welded tubular construction with the power and transmission unit arranged logically within the structure, the elephant "exhausting" through its trunk, while the 5 in. diameter tubular backbone acted as an air receiver on which the main chassis rocked as it walked. The legs, which were each pivoted at the top, were telescopic and became extended or retracted to give natural walking motions. As one leg stepped out, an air-operated brake was applied at its "wheel" end, causing the elephant to lunge forward, the other legs being telescopically adjusted to the new position when the action was repeated on other legs. The mechanism also allowed the trunk to sway and the head to nod while the elephant walked. It could also walk in reverse.

Three elephant chassis in an early stage of fabrication are shown in Fig. 1, where the tubular steel backbone and

Fig. 1. Three elephant chassis in an early stage of fabrication showing the welded tubular "backbone" which also acted as an air-receiver.



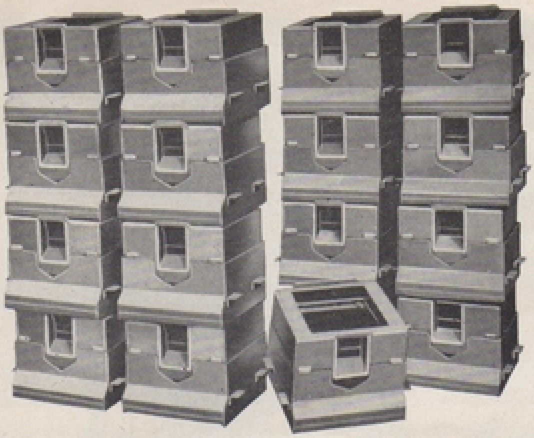


Fig. 2. Fabricated high-voltage switchgear bodies, produced by batch production methods. (Courtesy: Crompton Parkinson, Ltd.).

air-receiver may be clearly seen. Each chassis was made in roughly two halves, the first portion being welded to the main tubular member, while the rear half was slid over it and left free to rock slightly to accommodate a slight rocking motion of the hind legs. The brackets shown welded to the chassis side members acted as bearers for the "over centre gear" on the elephant's legs.

Early Interest in Fabrication

Originally a firm of engineers' smiths, the company became seriously interested in welding during a period immediately following World War 2, when there was an acute shortage of castings. At this time they were making faithful, welded copies of iron castings from existing drawings, but the necessity for a more fundamental approach to the problem soon became evident. Designs for welding worked out in conjunction with the customer, followed, and these were soon being produced in medium-size batches where cost savings of up to 30 per cent were realized along with vastly improved strength for the same weight of material. Today, in a factory of modern design, there are nearly 50 running lines comprising a wide variety of welded fabrications. Many of these are being made by batch production methods (Fig. 2). It is mostly sub-contract work for the larger engineering concerns, and the company offers something of a service to the engineering trades, its manifold skills being reflected in the wide range of products enumerated later in this article.

Works Policy and Administration

Bearing in mind that small units with payrolls varying from 25 to 100 employees possibly constitute not far short of half the total number of engineering firms operating in Great Britain; this firm is interesting as it is doubtless typical. In this instance, there are 40 employees. It is a family concern with that personal and human relationship between management and operator, for which there is no real substitute—an atmosphere which is, in fact, fostered, and because of it the policy is one of not allowing the firm to get too big, when men are apt to lose their identity as individuals. There is something to be said for this.

The works control methods are interesting, while there is a good superannuation scheme and an attractive bonus system. From an initial works study, each new running job is given a tentative time. When the first batch is completed, the main operations are further analysed in the light of this factor so that any slowing down or speeding up of individual operations may be controlled, and the shop methods reorganized accordingly. Working in conjunction with this is a weekly time book which shows the total time allowed for a batch, the hours already taken and the hours left to go, so that by checking work flow progressively, a job can be chased up and adjusted before it is too late.

An annual bonus system based on the company's profits was instigated originally, and while this worked well, there was a tendency for production to increase only towards the year's end. A new three-monthly scheme, where bonus became a function of the value of fabrications produced, was then inaugurated. This worked on a percentage basis of the men's weekly rate with a wage differential according to skills. It is interesting to note that, in the first year, producion rose by 28 per cent and by 56 per cent the following year, producing an average quarterly bonus increase of 120 per cent. The overall result of the new scheme, in which the management also share, is a happier working community; men are keen to do better work and the method is found to have fewer disadvantages than a piece-work system.

In practice, it works very simply. The target for each month of the three-monthly period goes into a "bottle" (Fig. 3). Not infrequently, the quarterly target is reached after only two months of operation, production thereafter representing "bonus", which is measured in the neck. The scheme promotes considerable enthusiasm and an "electric" atmosphere exists throughout the works towards the end of each period. The advantages derived from this scheme, which benefits employer and employee alike, may be gathered from the fact that it is now operating on a two-monthly basis. The system is kept under constant supervision and control, however, to ensure that quality is in no way sacrificed for quantity. Fig. 3 is of special interest as it reproduces an actual bonus chart for the work period from May 1 to July 31, 1959.

Products

In the main, products embrace platework varying from $\frac{1}{8}$ in. to $\frac{3}{8}$ in. thick with a fairly high proportion of labour

Fig. 3. The quarterly "bonus bottle" for the work period from May 1 to July 31, 1959.