

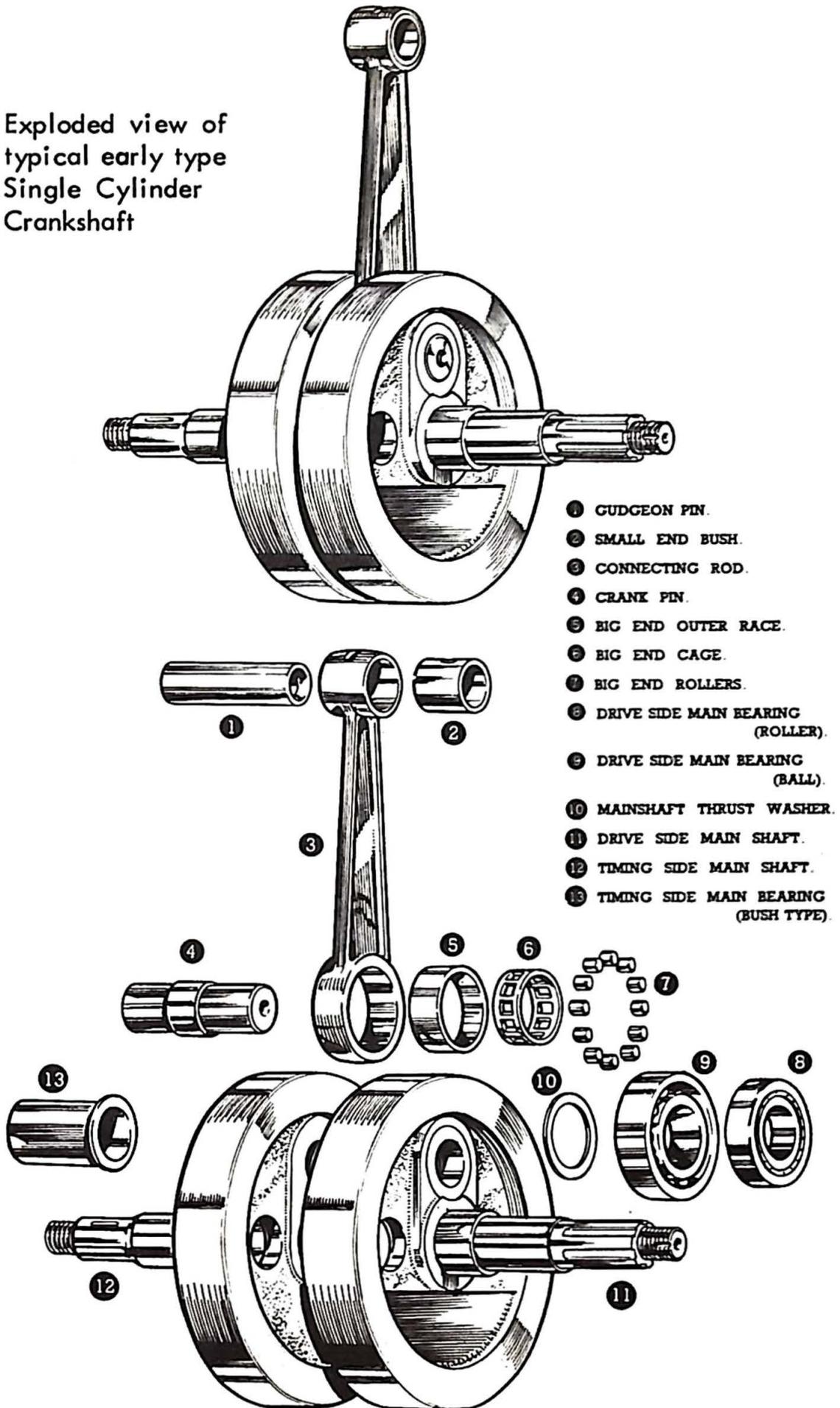
*Blast the  
big end's  
gone.*



*Better fit*  
**ALPHA**  
*the Perfect replacement*

ALPHA BEARINGS LTD · DUDLEY · WEST MIDLANDS

Exploded view of  
typical early type  
Single Cylinder  
Crankshaft



## “THE BIG END’S GONE”

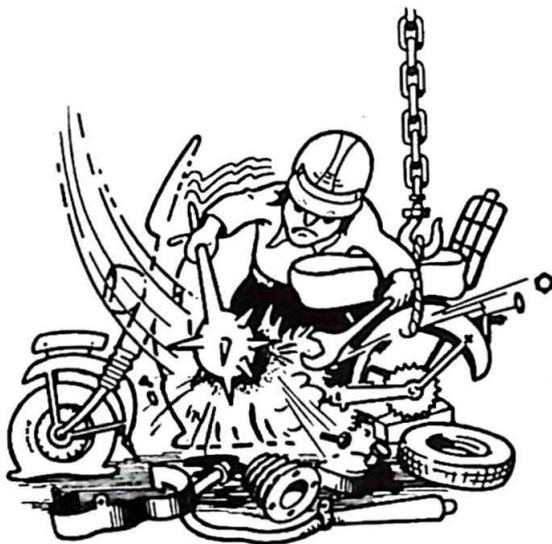
Faced with a worn big end bearing the private owner may find himself uncertain as to the best way of putting it right. Many motor cyclists are expert mechanics but crankshaft repairing brings problems additional to normal dismantling and assembly work. 'How are the fly wheels removed' - 'What about truing the crankshaft after re-assembly' and 'Will it be easy to balance' are but a few of the questions that will arise.

The purpose of this booklet is to give the private owner a broad outline of the various types of big end bearing together with details of the services offered by Alpha Bearings Limited - the countries leading specialists in this field. The main steps in replacing a big bearing are:-

- 1 Dismantling the engine and removing the crankshaft.
- 2 Dismantling the crankshaft.
- 3 Reconditioning or replacing worn items.
- 4 Re- assembling the crankshaft and realigning.
- 5 Re- assembling the engine.



“ . . . . Will it be easy to balance?”



“ . . . . Removing the crankshaft from the engine should be easy”

Alpha cannot assist with items 1 or 5 but most owners would have no difficulty in handling this part of the job. At this stage the complete crankshaft can be sent to Alpha who will carry out whatever work is necessary inclusive of re-alignment and return it ready for assembling back into the engine. Alternatively owners who have the facilities for dismantling and re-aligning the crankshaft may like to handle this part of the job also and need only send to Alpha those parts that require renewal.

Alpha specialise in roller type big end bearings and can manufacture practically every known variety regardless of age, model or design together with all necessary dismantling and realigning operations. Additionally Alpha can manufacture any kind of bronze bush for small end or main bearing, a complete range of valves and valve guides and also offer a high precision cylinder re-boring service and the supply of new pistons and a complete range of ball and roller bearings. Finally facilities are available to regrind crankshafts of the motor car type and to supply new big end shell bearings.

But that is the full extent of Alpha operations. No service is offered in connection with other engine parts and customers are particularly requested not to send crankcases or other items to us except by special prior arrangement. We can only prepare firm quotations on the cost of any work after we have received the items concerned for detailed examination but are always ready to give an approximate idea of our charges by post or by telephone before the goods are sent to us.

When sending heavy crankshafts and cylinder barrels the most satisfactory method of packing is to employ a suitable wooden box or very strong card-carton and to pack the goods using plenty of crumpled newspaper packed in tightly enough to prevent the goods bumping about. Very heavy wooden cases should be avoided as these will greatly increase the cost of delivery. Be especially careful when packing barrels as fins are easily damaged in transit. Customers cases are used for the return journey unless they are so badly damaged as to be unsuitable for this. It is best to enclose any letter or instructions in the box with the goods preferably tied to the components rather than to send the letter by separate post.



*“ . . . . Avoid heavy cases which add to carriage costs”*

It should be remembered that the weight restriction on parcel post is 22lbs, heavier items need to be sent by rail or by one of the road carriers. Our full address is:-

**Alpha Bearings Limited  
Kingsley Street  
Netherton  
Dudley  
West Midlands**

Goods arriving at Alpha for quotation are held in store until instructions to proceed are received. When work is actually put in hand a works order ticket is produced showing full details of all the items received and of the work to be carried out and which also bears our official job number. A copy of this order card is posted to the customer who can check that the work being carried out is in accordance with his instructions. Any enquiry about the job should always quote the job number as this enables the work to be identified without any delay.

The time taken to complete any work varies considerably. Some very straightforward jobs for which we hold stocks of service exchange parts can be turned round in one or two days whilst very complex work involving considerable individual manufacture can take many weeks. As in the case of price, reliable estimates of delivery can only be prepared once the parts are received at our



*" . . . . Sometimes a little delay occurs in transit!"*

factory. It is worth remembering that the parcel post and railway regularly take up to one week to deliver a case of goods which together with the return trip can account for two weeks without allowing for any time at our factory. Many owners who are within easy travelling distance find it preferable to bring items direct to us and to collect them when completed. We can sometimes arrange for goods to be collected from the factory out of normal hours but we must have advance knowledge of this.

By far the most satisfactory method of payment is for us to produce a pro-forma invoice when a job is nearing completion and when the exact cost will then be known. This enables the bill to be settled in time for the goods to be despatched as soon as they are ready. C. O. D. post is an alternative to this when goods are under 22lbs in weight and when there is no likelihood that the address will be unoccupied when the postman calls.

We are often asked about running-in. Big end bearings require very little in this direction and apart from a rather cautious first one-hundred miles or so no further attention is required. New pistons and cylinders that have been rebored should be run-in with exactly the same procedure as when the engine was new.

This booklet necessarily gives only a broad outline of Alpha service we are always pleased to hear from motorcyclists and to give our opinion on any detailed matter without the slightest obligation.

# **BIG END BEARINGS**

The principle activity of Alpha Bearings is the manufacture and repair of roller type big end bearings which consist essentially of a crankpin and rollers running in the big end of the connectingrod. The majority of modern machines employ connecting rods that have the big end eye hardened and ground to form the outer raceway for the rollers. The alternative to this is for the rod to be fitted with a detachable ring or sleeve.

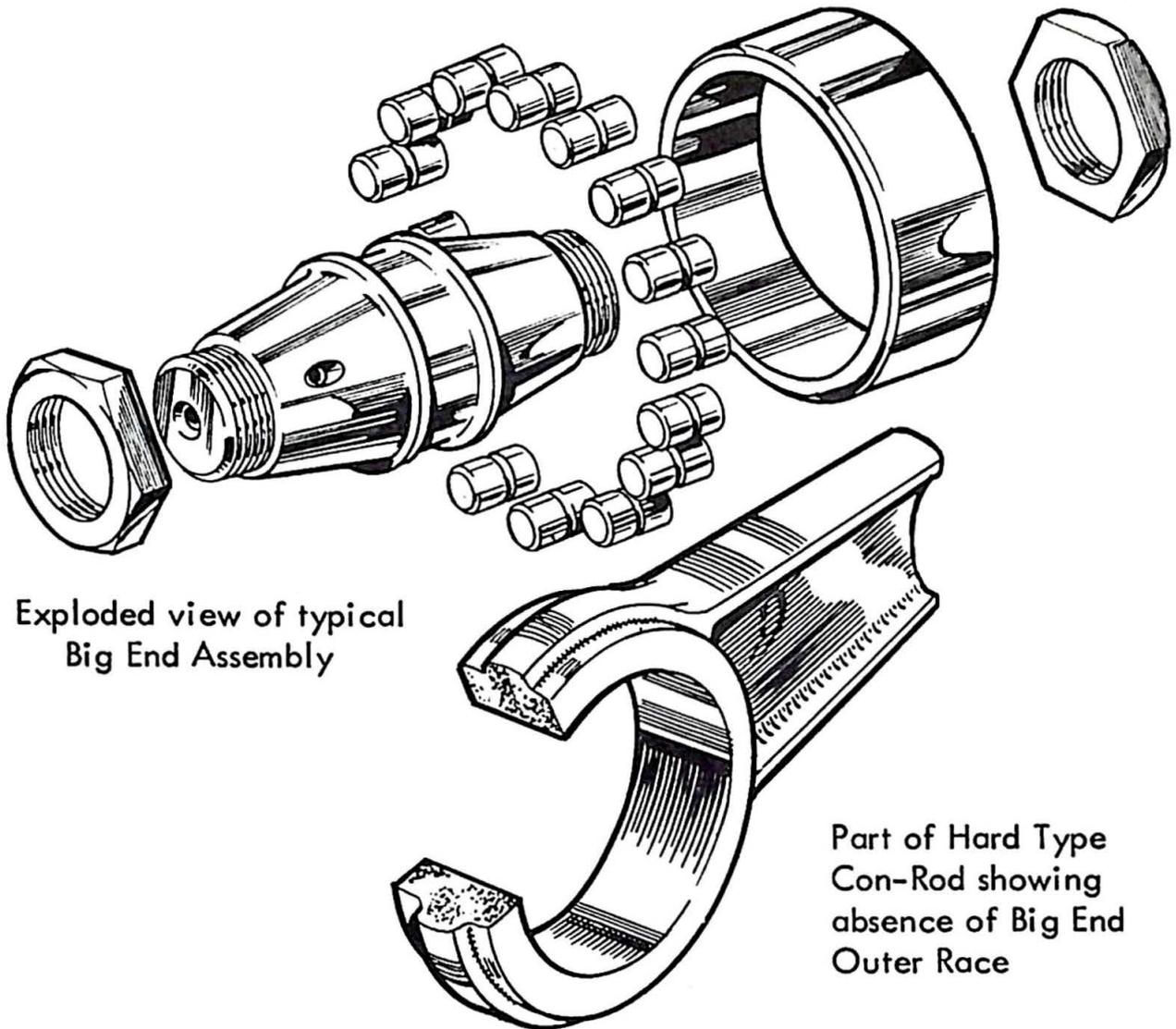
The method of renewing a big end bearing differs with the two types and the following details are given in order that the differences may be readily understood.

## **Bearings with separate outer races**

A big end assembly - sometimes called a 'loose assembly' - consists of a crankpin, a set of rollers, sometimes a roller cage and an outer race or liner. It comes as a complete bearing and requires simply to be pressed into the big end eye of the rod after the old bearing has been pressed out.

This operation is simple but suffers a serious disadvantage because the big end eye of the connecting rod usually becomes distorted in service and such distortion or ovality is transferred to the outer race when this is pressed in.

Roller bearings are made to very fine limits and the presence of such distortion can seriously affect the life of a bearing fitted in this manner. The satisfactory way out of this difficulty is to use a partly finished outer race, the inside diameter of which is not finally ground and to carry out this grinding after the race has been fitted to the rod. This method ensures the greatest possible accuracy and will add materially to the life of the bearing. This is generally something that can only be done in the factory but customers are particularly urged to have bearings fitted in this way whenever possible. Alpha offer a service exchange scheme on many popular types of connecting rod which reduces to a minimum any delay that this individual service might incur.



Exploded view of typical  
Big End Assembly

Part of Hard Type  
Con-Rod showing  
absence of Big End  
Outer Race

## **Bearings employing hardened connecting rods not having separate outer races**

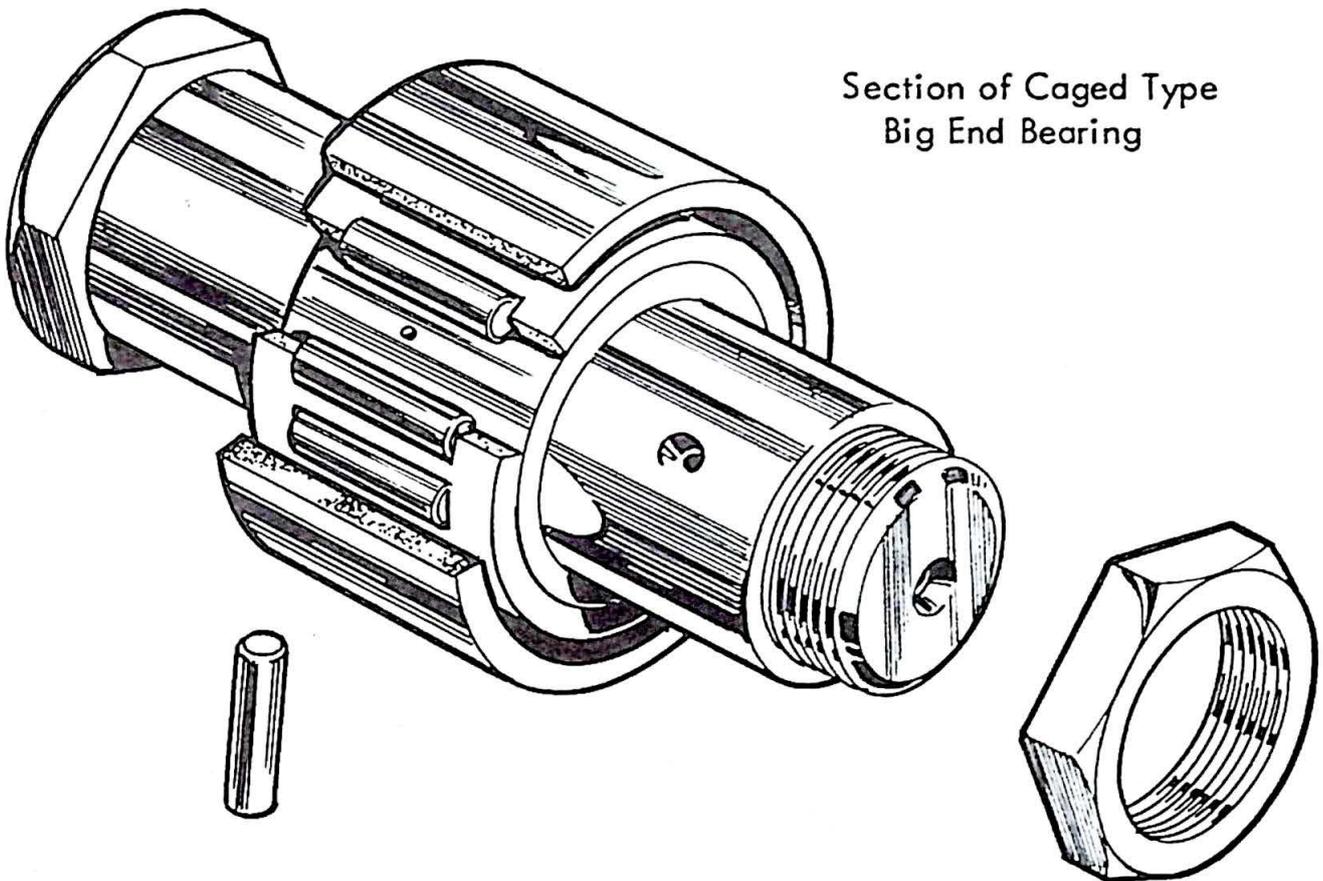
When this kind of bearing is worn the big end eye of the rod will be worn also and this will require repair or renewal.

If the connecting rod is broken or severely damaged then a new rod will be required in addition to the other parts of the big end bearing and Alpha can generally supply such items but the large majority of connecting rods can be reconditioned in the Alpha factory to a condition equal to new. More than a quarter of a century of experience on this work together with the most modern methods of heat treatment etc., enable such reconditioned rods to be fully guaranteed and they may be employed with every confidence but this re-manufacturing process should not be confused with spurious work involving the fitting of oversize rollers to take up any excess wear which is a very unsatisfactory way of restoring a bearing.

In order to minimise delay hardened type rods of all popular kinds are offered on a service exchange basis.

## Roller Cages

Some big end bearings employ cages that separate the rollers and reduce friction at high speeds when there is a tendency for a full row of rollers ('crowded race') to lock up and seize. It is important to replace cages that are worn or damaged and never take up the space they occupied by filling up the track with extra rollers.



## Shell Type Big End Bearings

Bearings of this kind, which are most commonly found on large capacity multi-cylinder machines e.g. Norton Commando or Triumph Trident etc. require the crankshaft to be reground and new undersize bearing shells fitted to the rods. Alpha is well equipped to carry out this work – further details and prices on application.

## **Small End Bushes**

There are three kinds of small end bearing. Most widely used is a simple plain bush of bronze or aluminium. Next in popularity is a needle assembly consisting of a set of small diameter rollers held in a thin steel cage and finally there are a few types where the gudgeon pin runs directly in the small end eye of the con rod which has been hardened and ground.

Replacement of plain bushes is a simple matter provided that means are available to ream out the new bush after it has been pressed into the rod in order to remove the slight contraction that takes place.

We hold very large stocks of these bushes and can generally despatch any normal requirement by return of post. Also we have special facilities in our works for the rapid fitting of bushes to customers rods for which we charge a modest price.

In the case of rods which have the gudgeon pin running directly in the small end eye or those that employ needle cages it will be seen that any wear in the small end eye will result in an imperfect fit if standard needle cages or gudgeon pins are employed. One way out of this difficulty is to replace the connecting rod but a more economical solution is to bore out the small end eye and fit a very thin bronze bush which can be machined in the bore to suit the gudgeon pin thus converting the small end bearing to the conventional, plain bearing design. In these cases separate bushes are not available from stock and the con rod concerned must be returned to our factory for attention.

## **Service Exchange Connecting Rods**

From the foregoing it will be seen that there is great advantage when big end bearings and small end bushes are fitted to connecting rods in our works, but inevitably some delay occurs when rods receive individual attention, and in order to give the best service possible we hold large stocks of most popular types of connecting rods fully reconditioned with new big end and small end and these are available for immediate delivery in exchange for old connecting rods.

Exchange rods are only supplied when a new big end bearing and small end bush is required, which means that rods received for big end only cannot be exchanged and must receive individual attention. Where rapid delivery is important it is recommended that a big end and small end be ordered so that such individual attention can be avoided.

There is, of course, not the least obligation to take a service exchange rod. We are always pleased to treat rods separately, particularly where polished or other special parts are concerned, but are anxious that customers may take advantage of our exchange service whenever possible.

## **Special Modified Bearings**

Generally Alpha big end bearings are identical in design to those supplied by the original manufacturer. There are instances however where our experience of an extremely wide variety of big end types enables us to produce bearings of modified design that are a substantial improvement on the original.

These modified bearings have met with great success and in some instances the actual motor cycle manufacturer has subsequently adopted our design. These bearings are generally completely interchangeable with the original bearing that they replace but where any modification of flywheels etc., is involved full details are available.

Most popular among these modified types are those for B. S. A. Bantam Racing, Vincent, Triumph Terrier and Cub, Manx Norton, Matchless G50, B.S.A. C15 and B40 and 197 cc and 250 cc Villiers. In each of these cases special descriptive leaflets are available upon request.

## **Main Bearings, Mainshafts and Main Bearing Bushes**

The mainshafts of a flywheel assembly are supported by main bearings held in the crankcase and these are of three principal kinds (as illustrated below).

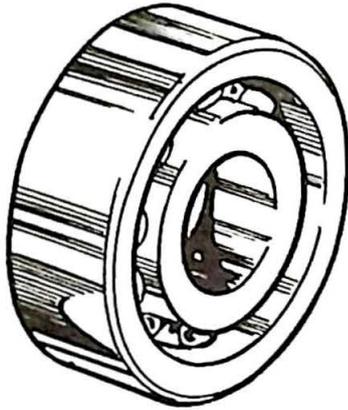
Most popular are standard proprietary ball and roller bearings that are pressed into the crankcase and through which the mainshafts pass. Replacement of this type of main bearing is most straightforward involving only the removal of the old bearing and substitution of the new.

Some main bearings are simply plain bushes pressed into the crankcase in which the mainshafts run. Such bushes generally require slight reaming after fitting to remove the effects of any contraction. This reaming operation needs to be done with great care, as slight misalignment of the bore of the bush may cause serious trouble.

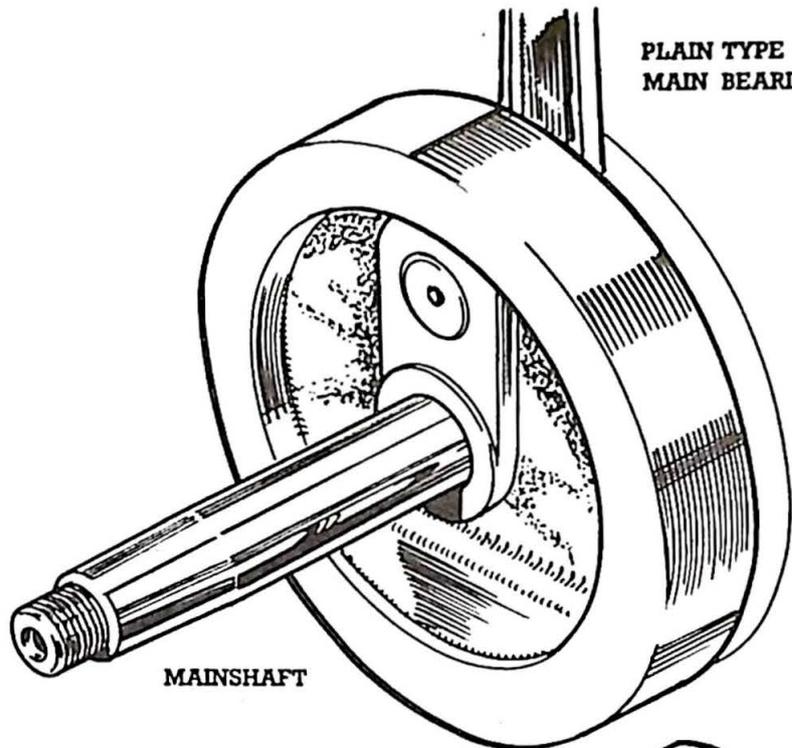
Rather less popular than the foregoing is the roller main bearing of the made-up variety. This type consists of an outer race fitted in the crankcase and a set of rollers housed in a cage. Here the rollers run directly on the mainshaft and main bearing renewal generally requires a complete assembly consisting of mainshaft, rollers, cage and outer race.

Alpha can supply almost every type of main bearing, mainshaft and main bearing bush, practically the only exception being certain mainshafts that have unusual splines and for which manufacturing tools may not be available.

STANDARD TYPE OF BALL OR ROLLER BEARING



PLAIN TYPE OF MAIN BEARING



MAIN BEARING BUSH

MAINSHAFT

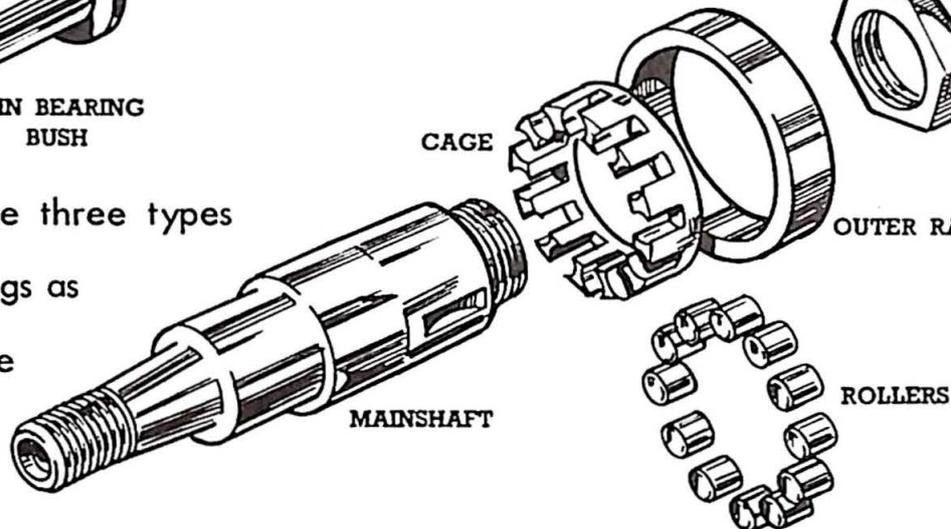
CAGE



MAINSHAFT NUT

OUTER RACE

Examples of the three types of Main Bearings as described above



MAINSHAFT

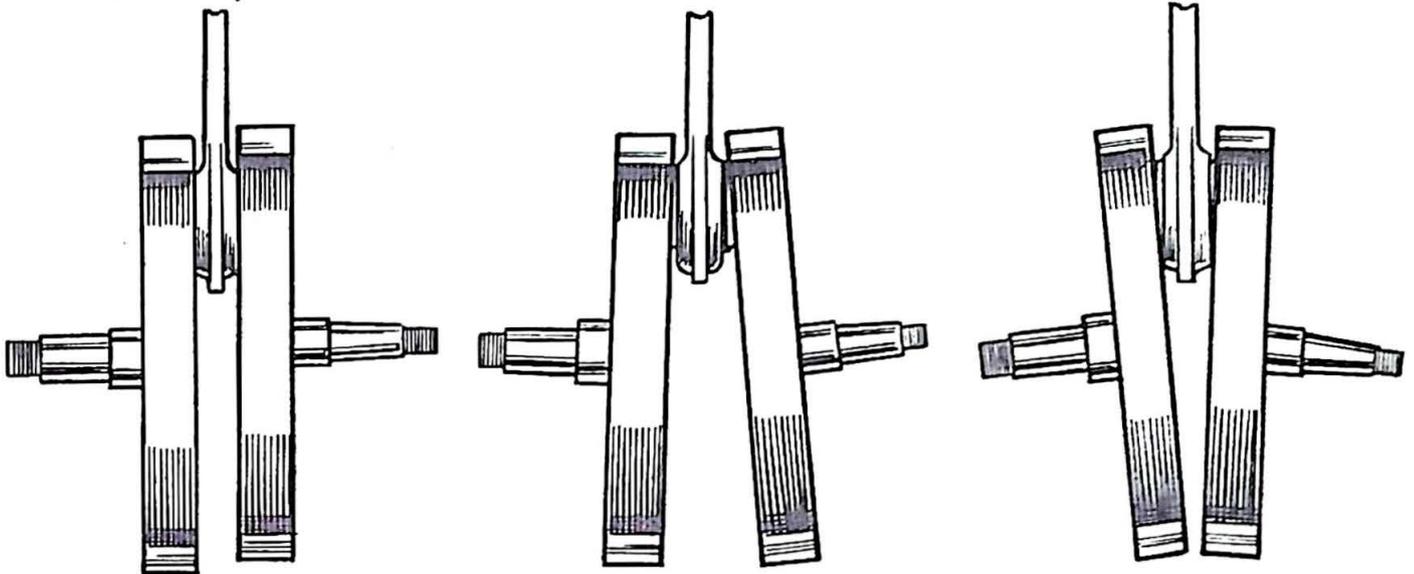
ROLLERS

## Crankshaft Assembly and Re-alignment

Any repair or replacement of a big end bearing involves dismantling the crankshaft or flywheel assembly and subsequently this will need to be re-assembled and re-aligned so that the two mainshafts lie in the same axis. A crankshaft that is not properly trued will give rise to a number of troubles. Apart from causing considerable vibration every revolution of the engine will bring a severe bending force to the crankpin and repeated use almost always results in crankpin breakage.

Special equipment is needed to dismantle, re-assemble and re-align crankshafts and generally the purchase of this is not justified in the case of a private owner who should find it more economical for the work to be carried out in our factory or entrusted to a competent trader.

However, Alpha produce all the equipment necessary to handle crankshaft alignment and have prepared a booklet entitled 'A Guide to Crankshaft Reconditioning' that fully describes the methods involved. Copies of this booklet are available free of charge on receipt of postage stamps to the value of 9p.



Typical examples of misaligned flywheels  
(the greatest single cause of crankpin breakage)

## **Crankshaft Balancing**

Flywheels are generally heaviest on the side opposite the crankpin and this extra weight is used to counterbalance the effect of the piston as it travels up and down the cylinder.

When an engine is modified involving the alteration of the weight of the piston or con rod etc., it may be necessary to re-balance the flywheels in the light of the new conditions.

This operation should not be confused with flywheel alignment and is never required unless non-standard parts have been fitted to an engine. Anyone requiring this specialised service is asked to let us have full details of the modifications concerned when we shall be pleased to advise them accordingly.

## **Valves and Valve Guides**

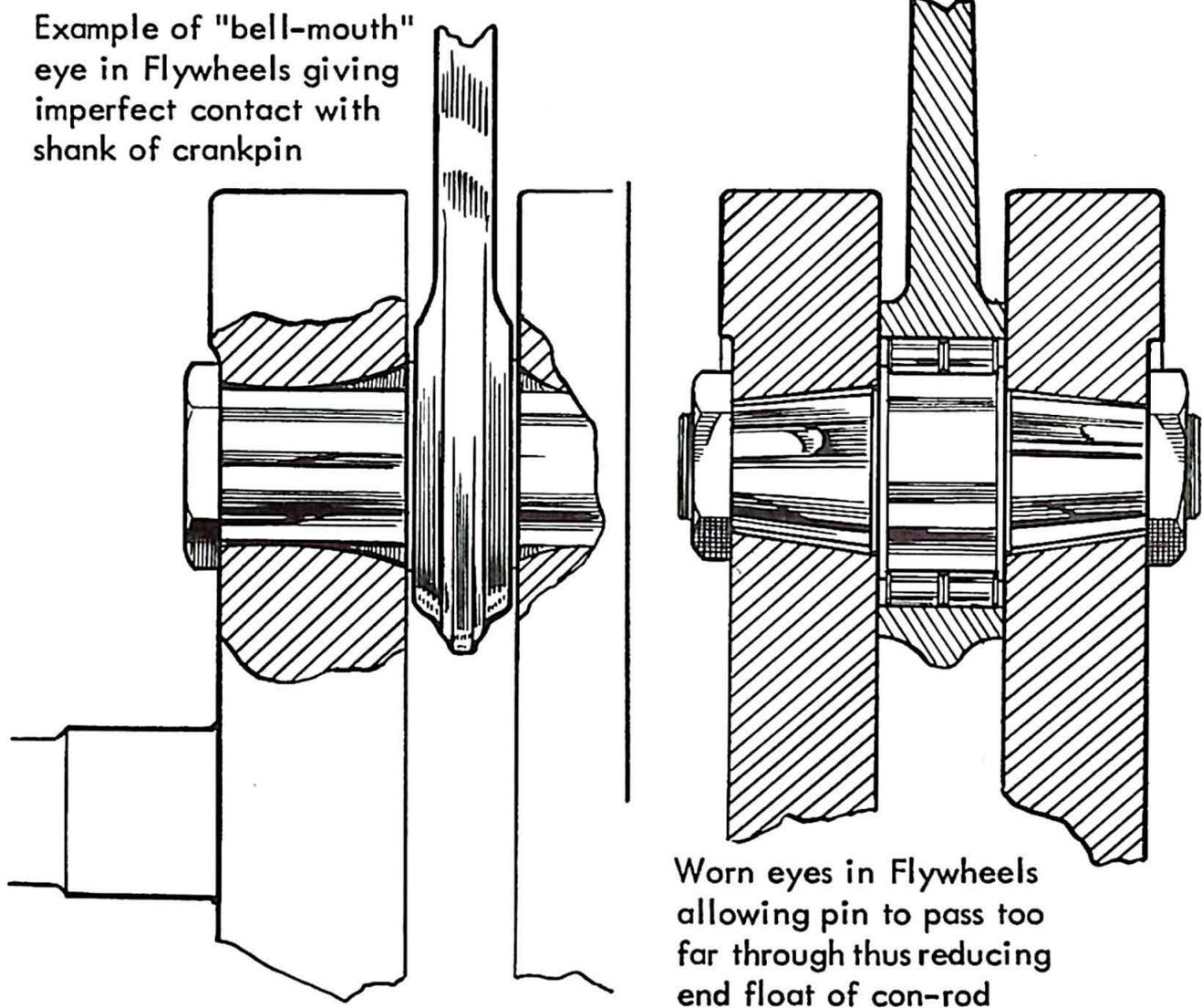
Alpha manufacture and stock a very comprehensive range of motor cycle valves and valve guides. Additionally, facilities exist for the manufacture of special valves to drawing or pattern where very obsolete or vintage types are concerned but this does not extend to valve guides and special types cannot normally be manufactured unless the quantities involved are reasonably substantial. Further details upon request.

## Cylinder Boring and New Pistons

Alpha is very well equipped to carry out reboring of all types of motor cycle cylinders and to supply new pistons. However customers are reminded that cylinders need to be exceptionally well packed if despatched by road or rail transport because fins are very susceptible to breakage if the parcel should be dropped and the packing does not provide adequate protection.

## Repairs To Flywheels

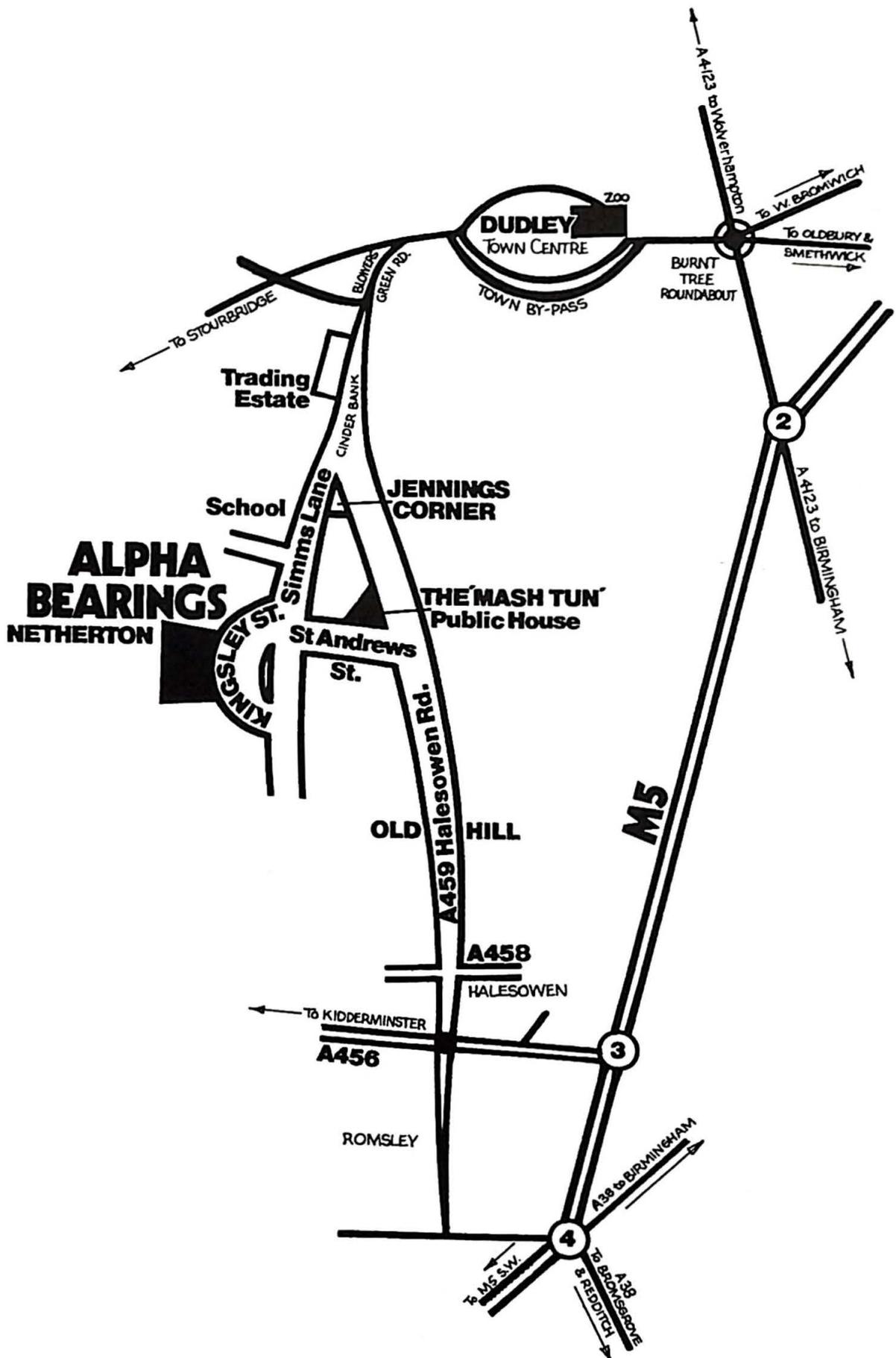
The crankpin eye of a flywheel into which is fitted the crankpin shank may become distorted or enlarged. Such conditions produce two main effects. Firstly, it may not be possible to align the flywheels to the usual limits and secondly, where enlargement is considerable either the crankpin cannot be sufficiently tightened or the con rod may become locked between the flywheels.



All the above troubles can be cured by boring out slightly the distorted eyes and fitting a suitably oversize pin. Sometimes flywheels become worn on the inside faces by the sides of the con rod. It is possible to repair such damage by turning away a small amount of metal and sinking in a hardened thrust plate.

Although we can usually give some idea of possible costs involved in this type of work accurate quotations can only be prepared when we receive the parts concerned for detailed examination.

The Alpha factory is easily accessible from various junctions on the M5 motorway.





**ALPHA BEARINGS LTD · DUDLEY · WEST MIDLANDS**