FRONZ / ONTRACK

APPROVED CODE OF PRACTISE
FOR
HERITAGE NETWORK OPERATORS

Mechanical Task Instruction B3.4.4.02

Care and Packing of Axleboxes

Issue	Prepared (P), Reviewed (R), Amended (A)	Approved by	Effective Date
1	P McCallum (P)	Heritage Technical Committee	27 June 2006

Reference Material

Source	Description	Date
NZ Railways	Care and Packing of Axleboxes	30/5/1932

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Amendment History

Version	Section	Amendment

Care and Packing of Axleboxes

1 Introduction

This Supplementary Code relates to:-
B3.1.1.01- Mechanical Code Of Practice, Section 3.4.2 - Plain Bearings

It contains:-

- NZ Railways; Care and Packing of Axleboxes; 30/5/1932

Care and Packing of Axleboxes; 30/5/1932

which contains information relevant to the care and packing of plain bearing axleboxes. Operators are to use those sections that are relevant to their operation.

CARE and PACKING

of

AXLEBOXES

and

BRASSES

LOCOMOTIVE SUPERINTENDENT
30.5.32

CARE AND PACKING OF AXLEBOXES AND BRASSES

- -

The cost of keeping axleboxes and bearings in good order, together with the cost of repairing and renewing bearings which have run hot, makes up a considerable proportion of the total expenditure on vehicle repairs.

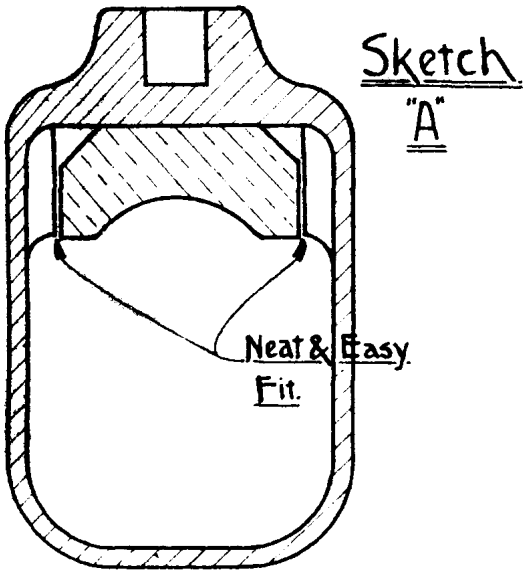
Further, bearings which run hot in service cause delays and necessitate transhipments which are a dead loss; therefore every care must be exercised to get the best from the material used, and to keep the number of hot bearings down to the unavoidable minimum.

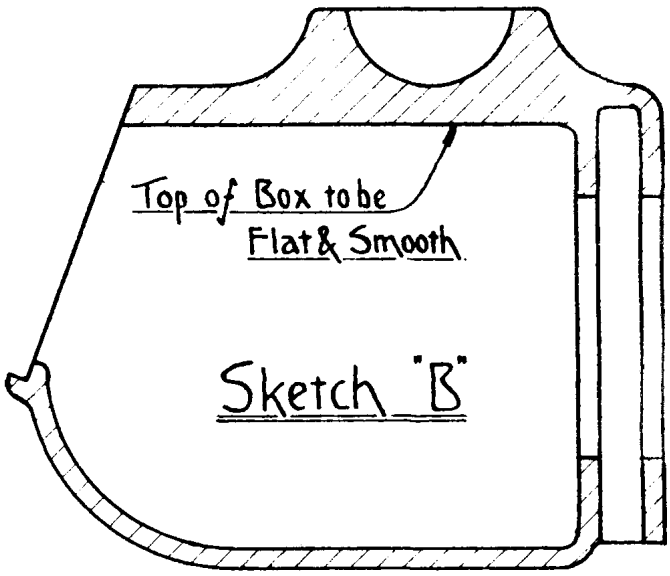
Many small mistakes, due to lack of information, are made with axlebox bearings, and these mistakes are the direct or indirect cause of bearing trouble. In order to reduce these mistakes, the following should be useful to staff who prepare attend to axleboxes.

EXAMINATION :-

Before placing any new axlebox in service, every care must be taken to ensure that the interior of the box is free from sand, grit, or any other foreign matter. Those surfaces of the box which rest upon the brass must be carefully examined, and any bumps or swellings in the casting which will prevent the free and neat fitting of the bearing must be removed. The brass and wedge must fit close - yet not tight - in order to distribute the load equally over the full bearing area (sketch “A”).

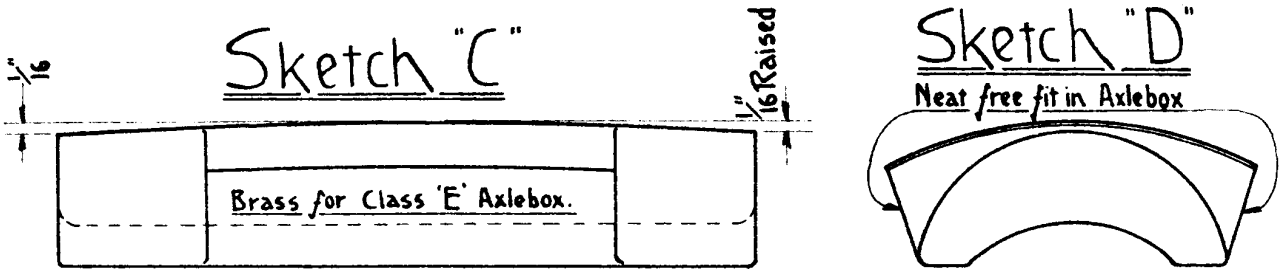
The top of the box, where in contact with the wedge or bearing must be flat and smooth (sketch "B").





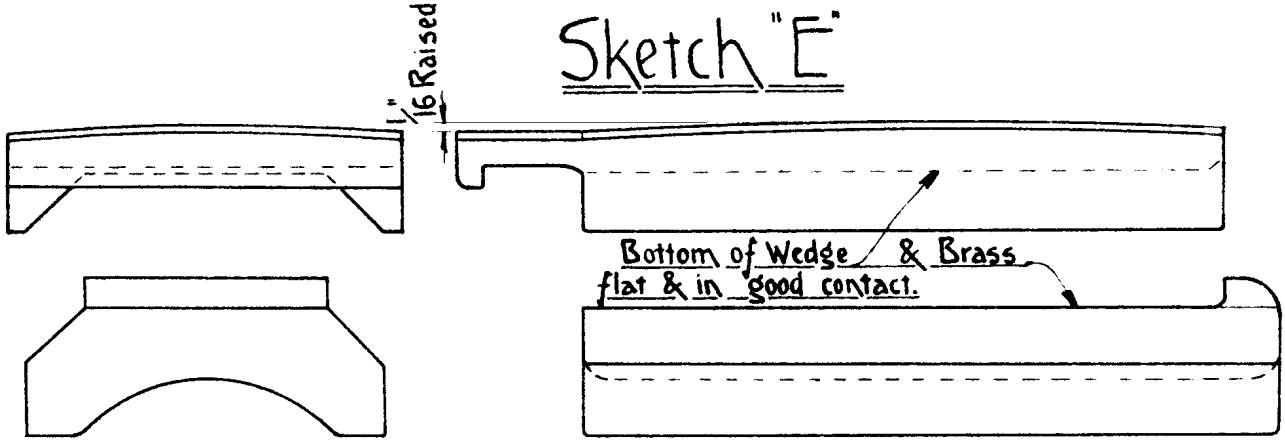
The end play of the bearing in the axlebox should be from 1/16” to 1/8”.

Bearings require careful examination before being put into service. In instances where wedges are not used, such as the “E” type axlebox the back of the bearing should be slightly arched in the centre when checked lengthways with a straightedge. This swelling permits a slight end roll between the bearing and the axlebox, which is necessary to give a good load distribution over the full bearing area (sketches “C” and “D”).

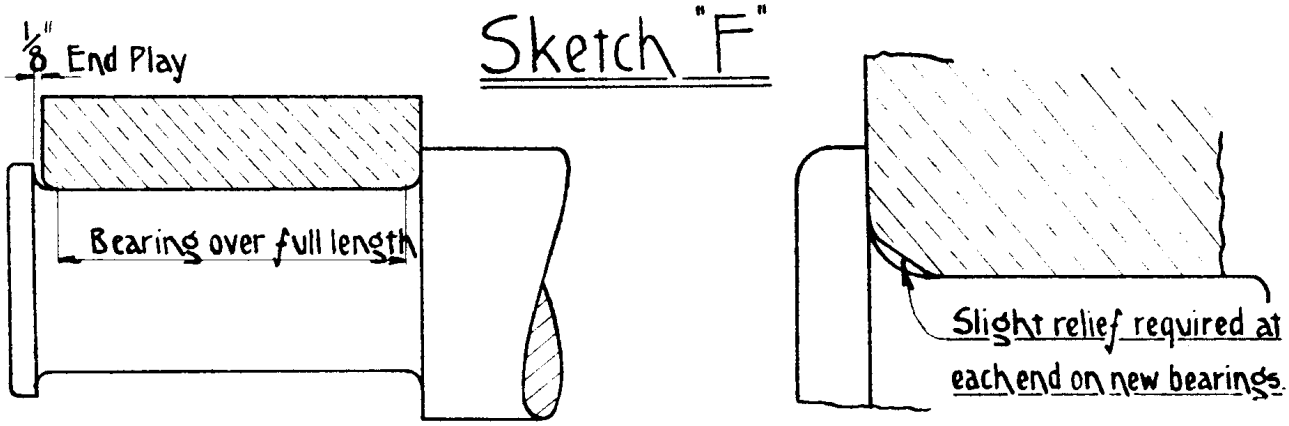


This type of brass should not bear against the box over the full length at the back, but it must be a close free fit sideways.

Where wedges are used, as in the "G" type axleboxes, the back of the brass should make reasonably good contact with the wedge when the bearing is in position in the axlebox. The back of the wedge in these types should be slightly arched to allow a small end roll between the wedge and the axlebox (sketch "E")



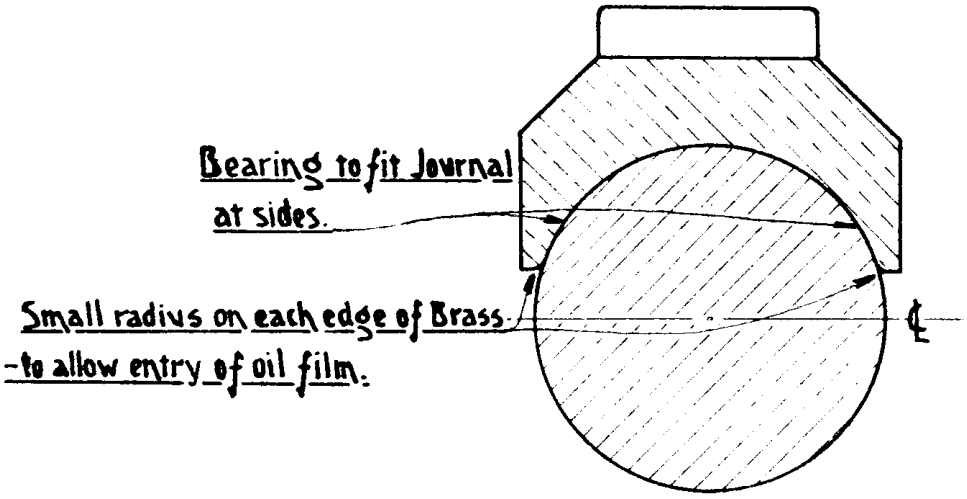
This roll allowed between axlebox and bearing (or wedge) is essential so that when any jar or rough riding tends to cause the axlebox to cant endways, the bearing will maintain full and even contact over the whole length of the journal, while the axlebox can roll on the back of the bearing (or wedge). This is most important when axleboxes fit neat in the horns.



When fitting bearings to the axle journal it is desirable to have as much bearing area as possible so that the pressure per square inch of the area in contact, due to the load, may be

kept low. The bearing surface should be brought well down at the sides to take care of the side thrusts caused by rough shunting and heavy braking (sketch “G”).

Sketch "G"



LUBRICATING FILM :-

Bearing surfaces when lubricated and running are separated by a very thin film of oil, which is picked up by the journal as it rubs over the packing. On this film the load actually floats, and the film must be maintained or a hot bearing will result.

A sharp edge will skim the film of oil off the journal as it revolves; therefore when fitting a bearing it is essential to see that no sharp edge is present which may act as a scraper. As bearings are prepared for use it is necessary to make a small radius along each edge of an oil groove or along each side of a bearing. This radius will allow the thin film of oil to wedge its way between the bearing and journal surfaces (sketch "G"). The small radius should be so made that it will not wear down to a knife edge as the natural wear of the brass takes place. At the same time, it is not necessary to destroy a lot of useful bearing area.

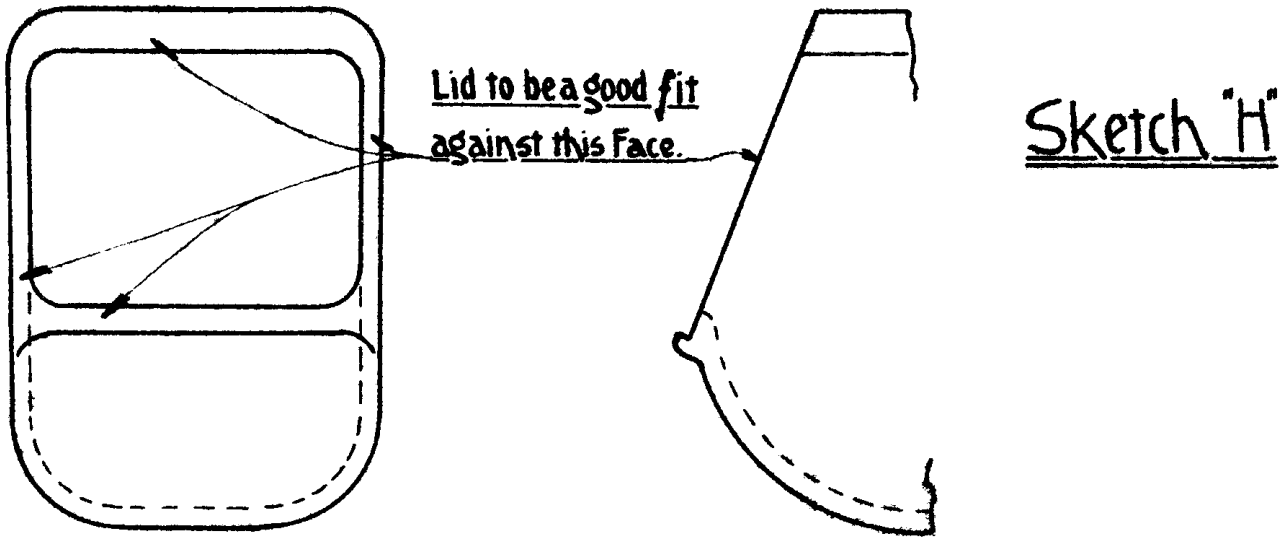
A well designed and correctly applied bearing will always generate a certain amount of heat. The thin film of oil, between the two surfaces is continually shearing while the bearing is in motion, and the shearing friction of the oil absorbs a small amount of energy, which is dissipated as heat.

DUST SHIELDS :-

Dust shields must be a good tight fit on the axle so that dust, sludge, water, etc., cannot throw from the wheels and work along the axle into the bearing. The dust shield is not to fit tightly sideways in the slot in the box; a small amount of sideplay in the slot is necessary to take care of any aide slack between brass and axlebox or between brass and journal.

AXLEBOX LIDS AND FOREIGN MATTER :-

Axlebox lids must be well fitted and kept in good order to keep out dirt and water (sketch “H”).



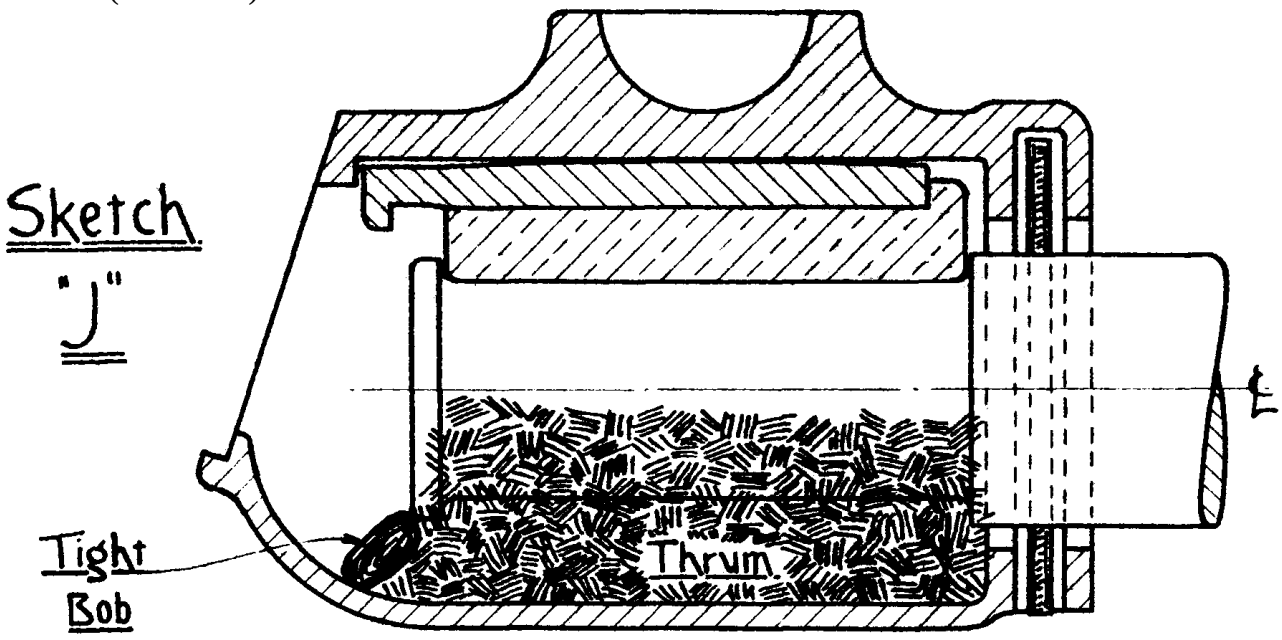
Gritty dust causes a bearing to run hot because the particles of grit which enter the box are thicker through than the film of oil between brass and journal. Hence, as they are carried up into the bearing with the oil they protrude through the film and cause abrasion of the brass and journal surfaces, thus forming knife edges which will destroy the oil film.

Water causes hot boxes by floating the oil out of the axlebox packing; water itself will not lubricate, as it has no film strength.

PACKING :-

When thrum packing is used, sufficient to pack the box firmly, out to the full length of the journal, and not more than half way up the journal at the sides, should be forced into the box (sketch "J").

The packing at the outer end of the journal can be keyed from working out by means of a tightly wound bob of flax or wool yarn which will wedge tightly against the sides of the axlebox (sketch “J").

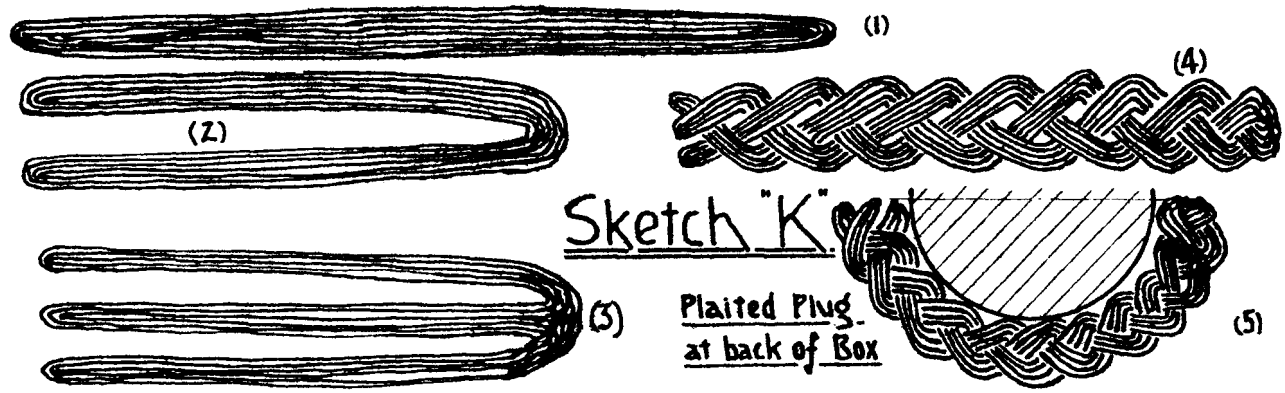


Wool packing as used in axleboxes must be carefully prepared before it is put into use.

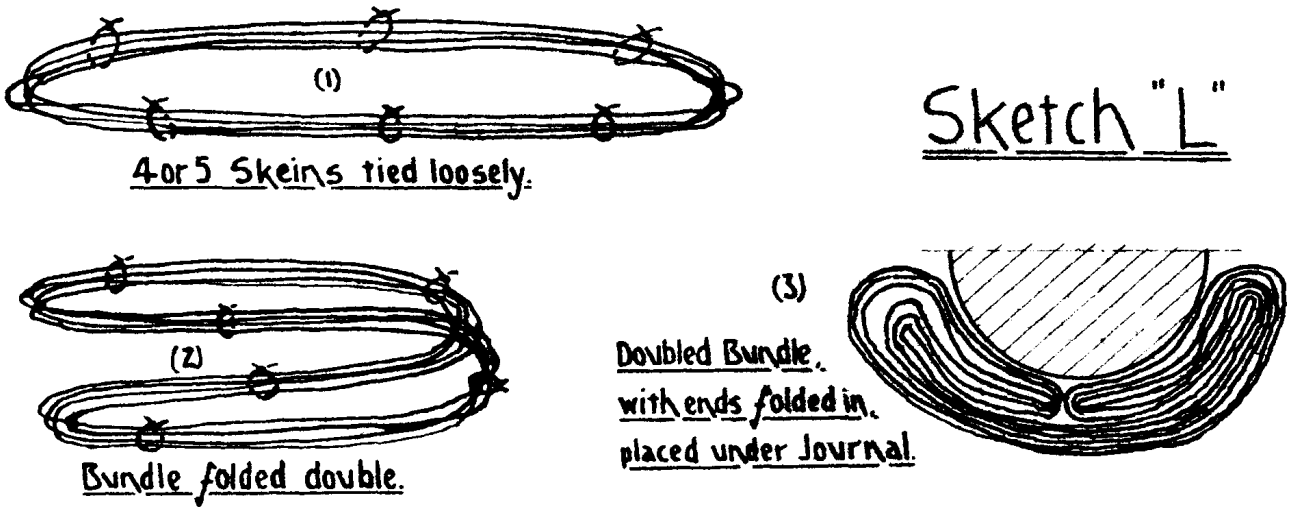
Packing should be very thoroughly soaked in axle oil for several days, the free oil poured off, and the packing left to drain off for at least 4 or 5 days, or until no more oil will readily run out of the wool. In this moist oily condition it should be used for packing axleboxes, because it is elastic or springy, and will keep in good contact with the journal. When it is sagging with oil it will tend to sink away from the journal as the vehicle jolts over the rail joints. The box should be firmly packed with moist springy packing, and a small quantity of clean axle oil, roughly half a pint to each freshly packed box, should be applied to the packing along each side of the journal and in the front of the box.

Wool yarn makes an excellent packing for axleboxes, but it must be applied very differently from thrum packing. The skeins of wool should not be cut into pieces as this spoils the packing, making it difficult to apply.

When working wool yarn it is advisable to prepare the skeins for use before soaking them. Plaited plugs should be prepared for the inner ends of the axleboxes - one separate plug to be used at the back of each box. This plug is made by taking one skein ((1) on sketch "K"), doubling it (2), dividing the strands into three parts (3), and plaiting it up (4).



The remainder of the packing for a box is made up of skeins loosely tied up into bundles of 4 or 5. These bundles are folded as they are fed into the axlebox as shown (sketch "L").



Also, when yarn packing is used it should not come above the centre line of the journal. The yarn packing should be keyed at the front of the box by means of a tightly wound bob.

Spring type oilers are very easily applied. They must be well soaked before use. When the oil is kept clean, and free from water this type of oiler will give good service.

No matter what type of packing may be used, always make sure that no strands of the packing hang out of the axlebox. Loose strands hanging down will act as a syphon, and in time will drain the oil from the packing out on to the track.

EQUIPMENT AND TOOLS :-

In order to get the best results from axle bearings certain equipment and tools are essential.

Axleboxes, brasses, wedges, etc., call for no special storage, although a clean location is a decided advantage, as it reduces the amount of cleaning and preparation required at the time of use, since, for good results to be obtained, all parts must be made reasonably clean and free from grit before use.

Packing requires clean dry storage; it must be kept free from grit and moisture, as damp packing will not get fully saturated with oil.

To prepare new packing for use, two or three tanks with dust-tight hinged covers should be used. These tanks will give best results if fitted with a loose perforated tray standing 1" or 2” clear of the tank bottom. A 1” bib cock below the false bottom is required so that the tank may be drained.

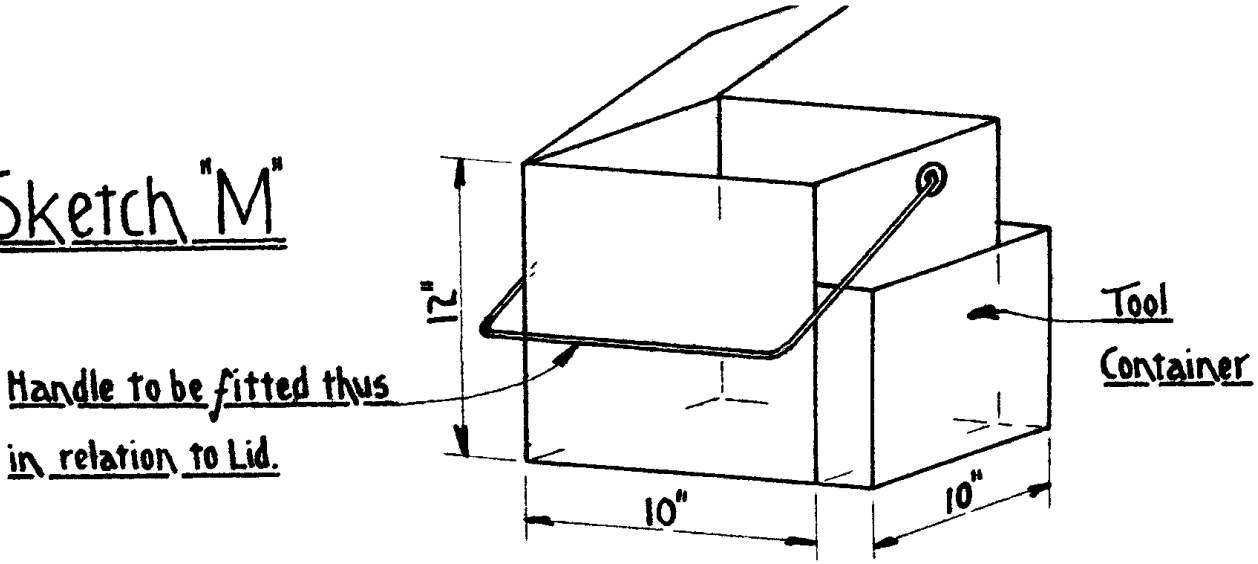
When using these tanks - (a) No. 1 is filled with packing, and oil is poured into it until the packing is covered with oil. The packing is kept covered for 6 or 7 days so that it becomes thoroughly soaked. (b) No. 2 tank is filled with packing, oil drawn from No. 1 is poured into No. 2, and fresh oil added until the packing in No. 2 is covered and soaked. (c) The thrum in No. 1 should be allowed to drain for 4 or 5 days before it is used. Use all the thrum out of No. 1 before starting to use the thrum in No. 2.

The number of tanks should be decided according to the amount of packing used and the size of the tanks, so that this cycle may be maintained. After every 10 or 12 cycles, or as found necessary, the false bottoms should be removed, and any sludge or sediment cleaned out of the tank bottom.

Always keep the tank lids closed. These tanks should be located in the Shop or Depot, preferably in an open space, so that the risk of dirt and moisture getting into the packing is reduced to a minimum, and oil and packing may easily be handled into and out of the tanks. By this method the tendency to collect filth and to cause dirty surroundings will be considerably reduced.

As it is just as necessary to keep the packing clean after soaking, specially made clean buckets fitted with hinged covers and some compartment for tools used (sketch "M”) should be made available to handle the packing from the storage tank to the axlebox.

Sketch "M"



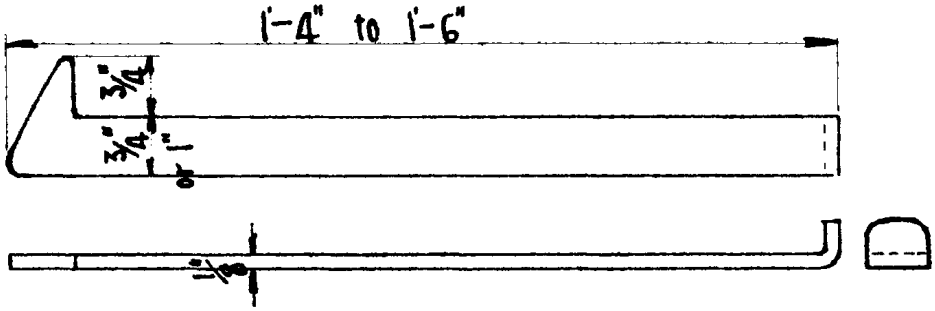
The bucket provided for carrying packing should be used solely for that purpose; tools such as hammers, chisels, scrapers, small bottle jacks, etc., should not be carried in with packing, but in the compartment provided, or in some separate small bag or container.

When not in use, the buckets provided for handling packing should not be left on the floor where they were last used until again required - these buckets are tools and convenient clean places should be allocated for storage where they will keep clean and tidy and will not be knocked about.

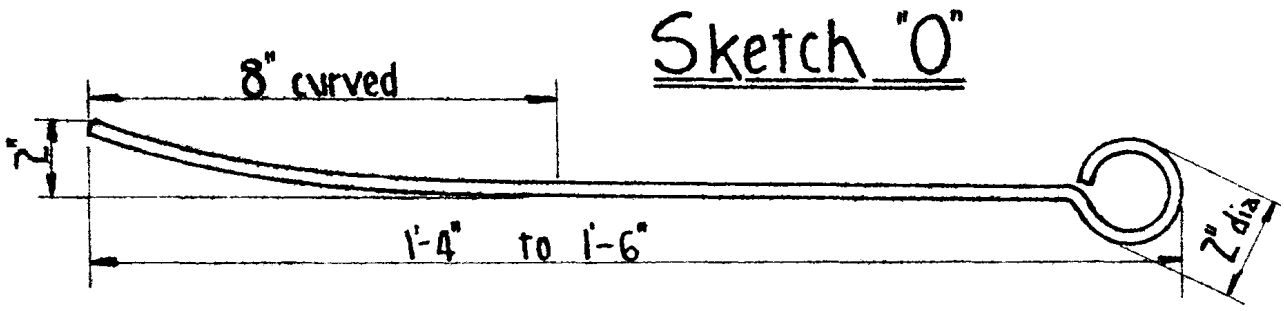
With the packing bucket, two Special Tools are necessary.

To remove the packing and a brass from an axlebox for inspection, a tool is required which can be used to hook out the packing, and then be turned to pull the bearing out. For this purpose a tool made from a straight piece of steel 3/4” x l/8" or l" x 1/8" and 16” or 18” long, shaped as in sketch "N", is very satisfactory. All sharp edges and corners must be rounded and cleaned off so that the journal and bearing surfaces will not be scratched or otherwise damaged.

Sketch "N"



A special tool is necessary to make a satisfactory job of packing a box. This can be made from 1” x 1/8" bar steel as shown in sketch "O", and should be 16” to 18” long, with all sharp edges and corners rounded and smoothed off, so that journals cannot be scraped or scratched when it is being used to force the packing into the box below the journal.



Misuse or careless handling of tools is often the cause of a defective or hot bearing.

Tools used for packing must be kept solely for that purpose; also they must be free from dust and grit before being used in the axlebox. When working on a bearing do not put the packing tools down on the ground or up on a muddy or dusty underframe, where they will be sure to pick up grit. On no account should packing tools be used as scrapers to clean accumulated dirt off the outside of an axlebox. A piece of gritty waste will not clean a dirty packing tool. Keep the tool free from dirt and grit so that it may go from box to box without being wiped.

Oil wastage takes place through "creeping", therefore fresh oil must be added to the axlebox packing at regular intervals. It is good practice to see that the packing is well tucked up to the journal when the box lid is opened for oiling, but before disturbing the packing make sure that the packing in the front of the box is clean, otherwise dust and grit which has worked in past a badly fitted lid and lodged in the front of the box will get tucked into the bearing, so causing trouble. If in doubt as to the cleanliness of the front packing, remove a layer before tucking the box.

Oil cans and syringes are equally effective for oiling axleboxes, but the oil can is the cleaner and less wasteful tool, as it entails less handling of the oil. If an oil can is used, keep it clean, have a cap for the filling hole, ensure that the oil goes clean into the can, and see that the spout is clean before it enters the axlebox.

If a syringe is used do not carry the oil round in an open can such as half a kerosene tin. Have a can made with an opening just large enough to admit the syringe, and keep a cover on the opening when the can is not in use.

A small quantity of clean oil is of far more value in the axlebox than any amount of gritty oil.

GENERAL :-

There are causes for hot axle bearings other than those due to defective and faulty materials and wrong application, over which the staff who prepare and apply the axle bearings have no control. In addition, many hot bearings are due to mistakes made when axle bearings are assembled and packed, or when they are examined and oiled.

To get good results, it is necessary to give close attention to every detail, since a defect in any one will not be offset or compensated for by the attention given to the other details.

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