BLACKSMITH'S MANUAL ILLUSTRATED

A PRACTICAL TREATISE ON
MODERN METHODS OF PRODUCTION
FOR
BLACKSMITHS, APPRENTICE BLACKSMITHS,
ENGINEERS AND OTHERS

BY

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PRACTICAL BLACKSMITH AND EX-FOREMAN (SCOTSWOOD WORKS OF
SIR W. G. ARMSTRONG WHITWORTH & CO., LTD.)

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FOREWORD

This is a reprint of the BLACKSMITH'S MANUAL ILLUSTRATED originally published in 1930. The complete text has been reproduced with new pages on temperature and measurement conversion and safety added to the back of the book.

The Rural Development Commission gratefully acknowledges the cooperation of the late author's family in bringing this valuable book back into print.

The Commission has always been involved in promoting traditional rural crafts and today also offers training and technical publications in many disciplines including forgework.

Forgework courses are set at various levels and cover: general smithing techniques, scroll work, fitting and framework, power hammering and toolmaking, art metal work, block repoussé, gilding and decorative effects.

The Rural Development Commission advises the Government on economic and social matters affecting rural areas and takes measures to further their development. Its prime aim is to stimulate job creation and the provision of essential services throughout the English countryside. Nearly 30,000 small firms receive advice, training or finance from the Commission.

INTRODUCTORY

In compiling this book on Blacksmith work, I have in mind the many little difficulties which arise from time to time in this class of work.

In my own experience, and also in that of my fellow workmen, problems both of time saving and labour saving have had to be solved, and the "tricks of the trade" and "wrinkles" which have been learned thereby, are passed on in this book to anyone who can make use of them. I trust that they will be found of real service to the young and ambitious smith. Blacksmithing is a trade difficult to learn. Well termed the King of Trades, practically every kindred trade depends on it in some shape or form. Tools, without which modern methods could not be developed, have to be speedily made, repaired and tempered.

I have endeavoured in this book to demonstrate, by drawings and simple text matter, specimens of smith work commonly done, and the best, simplest and quickest way to do them. From my own experience, gained at the forges of different engineering works, I have tried to pass on the easiest and best methods of arriving at the finished job.

The different types of forged work seen to-day, and the various methods by which they may be done, appear to be endless. It is not surprising, therefore, that many smiths are often at a loss as to how to commence a job

and how best to proceed with it. It is no uncommon sight to see a smith commence with what should really be an intermediate or final operation. Valuable time and material is often lost through such methods.

With a view to surmounting this difficulty, I have illustrated the finished article, the commencing, following-through and final operations, which have proved under various conditions to be most successful. To become a good smith, the ability to concentrate one's mind on the work in hand is necessary. While the iron is in the fire, the smith should be mentally visualising the various operations to be gone through immediately the iron is ready.

He is a poor workman who brings his heated iron below the hammer with no clear idea in his head as to what he intends to do first. A good motto would be, "Think first and act afterwards." The smith who is well equipped with tools will often finish his job in one heat, whereas the smith using antiquated methods will require three or four heats for the same job. Some of the tools illustrated in this book might almost be called "labour-saving gadgets," as in many cases they have no resemblance to the orthodox tool. The smith who has to rely on his striker has obviously to use different methods from the smith who has the advantage of the steam hammer.

Rapid calculations plays an important part in modern smith work, and the smith who can reckon in figures the required length of material necessary to do a certain job has the advantage of his fellow workman who merely relies on guesswork. I do not suggest that the working blacksmith should be a skilled mathematician, and I have therefore embodied in this work one or two simple formulas for calculating length, which will be found to work out very

well in practice. These formulas can quickly be acquired by memory, and the smith will then be saved the worry of wondering whether he has cut enough material for a job, or whether he is going to have a big waste of bar.

In a sentence, I have endeavoured to show, by illustrations and text matter, how to obtain the length of material for a job, the tools required, and the operations necessary to complete the job in the most expeditious manner.

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CAST-IRON FORGE

There are various forges in connection with blacksmith work, and the illustrations given show one or two designs in common use.

In FIG. 1 is shown a cast-iron forge fitted with a water-cooled tuyère, which protects the nose from burning when coming in constant contact with the fire.

If at any time the blacksmith's shop requires to be re-arranged, this design of forge can be easily moved, not being fixed to the floor, as is the case with the brick forge illustrated on the following plate.

CAST IRON FORGE. PLATE 1

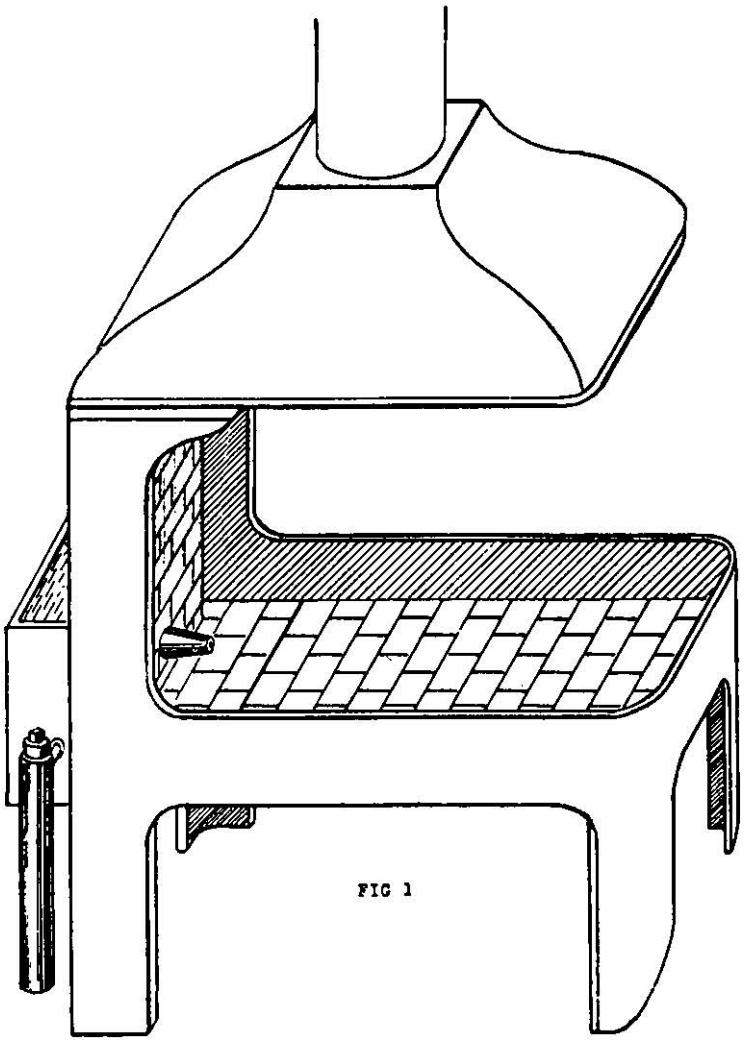


FIG 1

FORGES OR HEARTHS. PLATE 2

BRICK FORGE

In FIG. 1 is shown a common type of forge which is built of bricks. It is fitted with a water-cooled tuyère and a water trough underneath the hearth. This forge, unlike the one illustrated in PLATE 1, is a fixture and cannot be moved about.

The average height of the hearth is about 2 ft., having a length 3 ft. 6 ins. and a width 3 ft.

BRICK FORGE.

PLATE 2

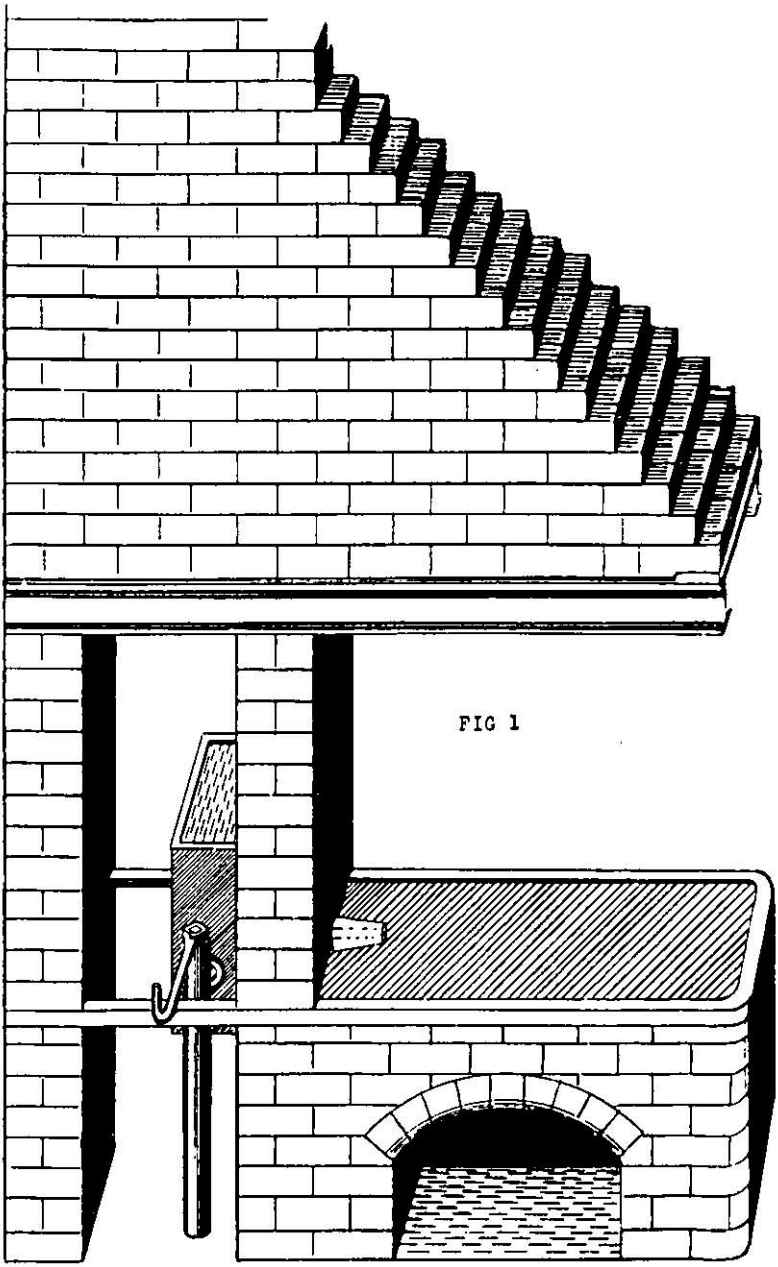


FIG 1

FORGES OR HEARTHS. PLATE 8

HEARTHS

In FIG. 1 is shown a method to adopt when heating large quantities of small tools all over. Arrange a few bricks on the hearth so as to form a small furnace, the bricks being kept together by means of wet coal surrounding them.

The fuel for such a fire is coke. Place the tools to be heated on top of the coke, and to get a good heat, place a brick in front of the fire. This can be easily moved, when taking the tools out, by sliding it along on the bricks placed for that purpose.

In FIG. 2 is shown another method for heating large quantities of tools which have only to be heated at the ends.

Take a 1½-inch square bar and double it as shown Place this bar in front of the fire and bank over with wet coal. This forces the heat through the opening, and by placing the tools between the bars a satisfactory result can be obtained.

HEARTHS

PLATE 3

FIG 1

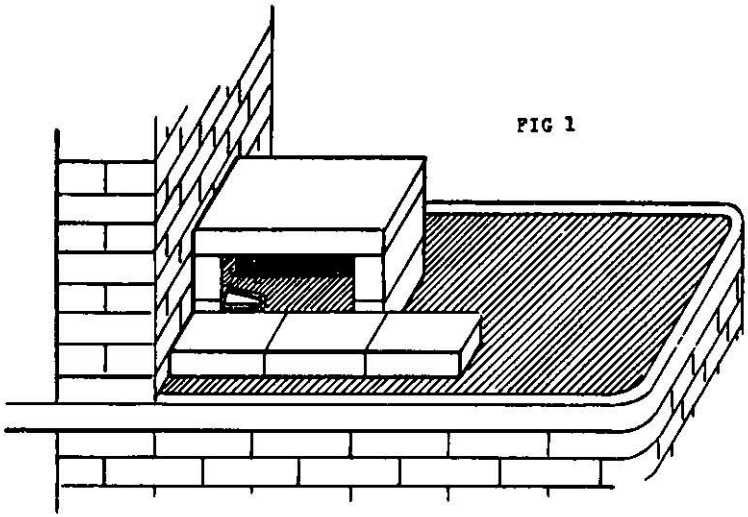
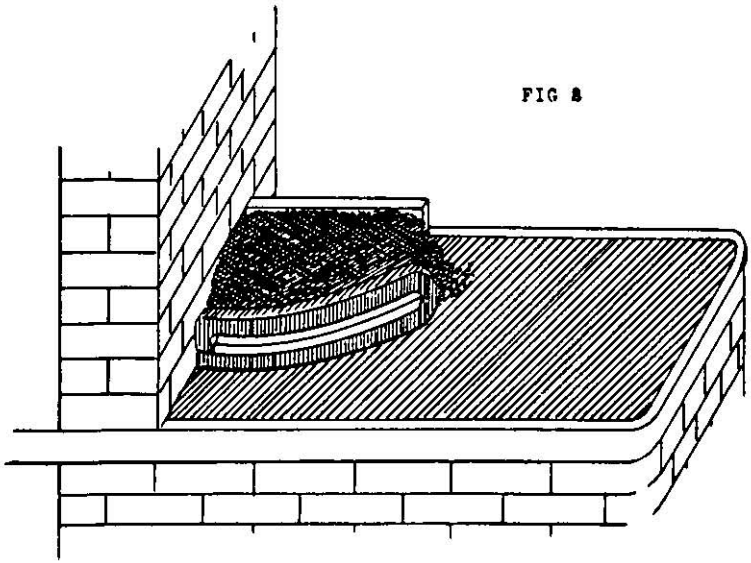


FIG 2



FORGES OR HEARTHS. PLATE 4

POT FIRE

FIG. 1 shows what is commonly called a pot fire. It can be adapted in many ways, and the building of such a fire is very simple. It is made about 2 ft. high and 3 ft. square, and should be situated so that the smith can work at it from all sides.

FIG. 2 shows a section of the pot fire. The fire hole is 18 ins. deep, 12 ins. at the base and 6 ins. at the top, the air-blast entering 15 ins. from the top. The base of the fire hole is composed of a sliding door which is easily pulled out for cleaning the fire. After the fire is cleaned, adjust the door and place on top dead ashes, as shown in the sketch, reaching to the blast entrance. This prevents it from becoming too hot. The best fuel to use for such a fire is coke.

The Author's experience has shown this fire to have no superior in heating large forgings and in welding. Having no canopy hanging over, as in the previous illustrations, it is easy to work at.

The force of air can be increased by arranging an air-blast at the opposite side, similar to the one shown.

POT FIRE.

PLATE 4

FIG 1

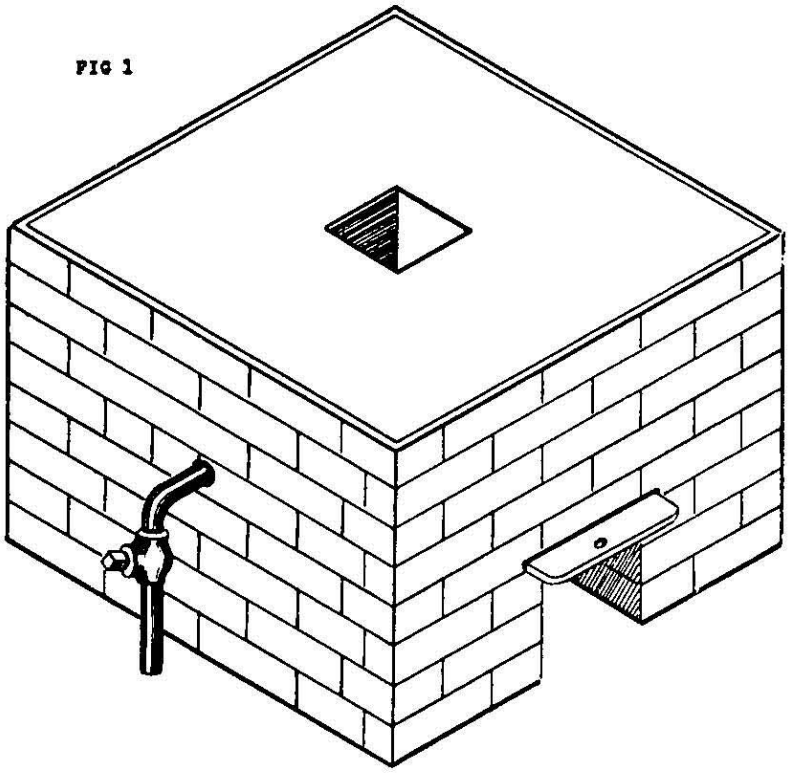
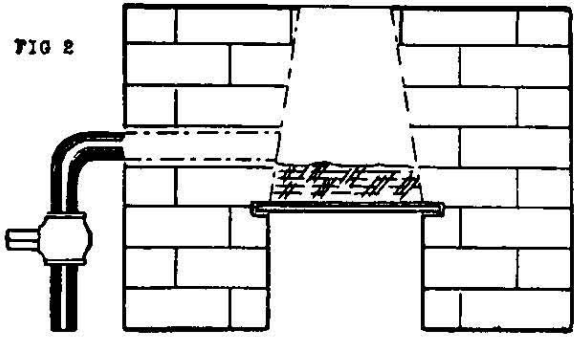


FIG 2



FORGES OR HEARTHS. PLATE 5

POT FIRE

FIG. 1 shows a method of building on top of a pot fire with bricks, when heating large bars. The advantage of such a fire is that the material is heated with flame, which keeps it free from all dirt.

To build such a fire, arrange two walls of bricks in single tier three or four bricks high and place on top large flat bricks. Enclose the bar by placing loose bricks around it as shown. When the bar is heated, these can be easily removed. When heating very large bars they should rest on two bricks, one at each side of the fire hole, thus allowing the flame to circulate around the bar.

FIG. 2 shows a method of covering over the top of the fire when bricks large enough are not obtainable. Make a clam from 2-inch by §-inch bar, and slightly bend it. Bricks can be held together in this clam as shown. To lift off the clam containing the bricks, place a rod through an eye bolt which is riveted in the centre of the clam.

POT FIRE

PLATE 5

FIG 1

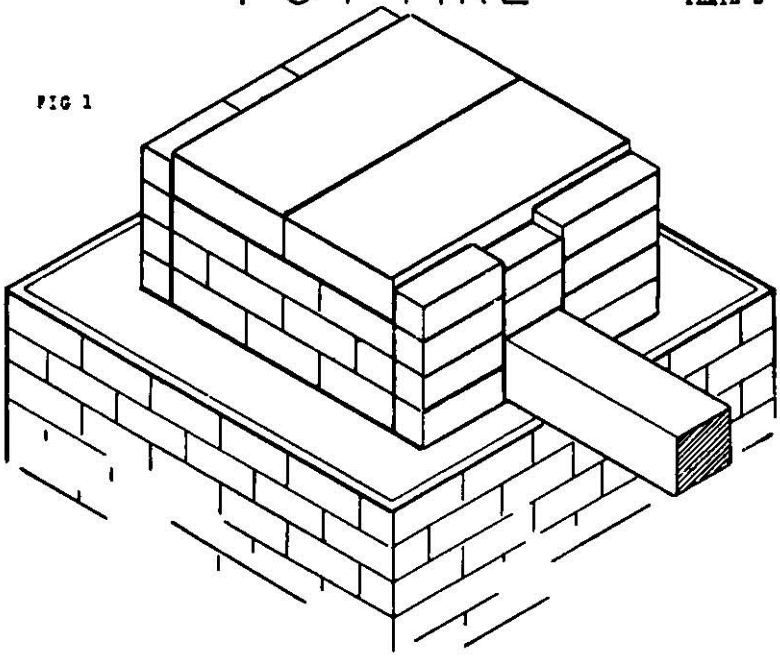
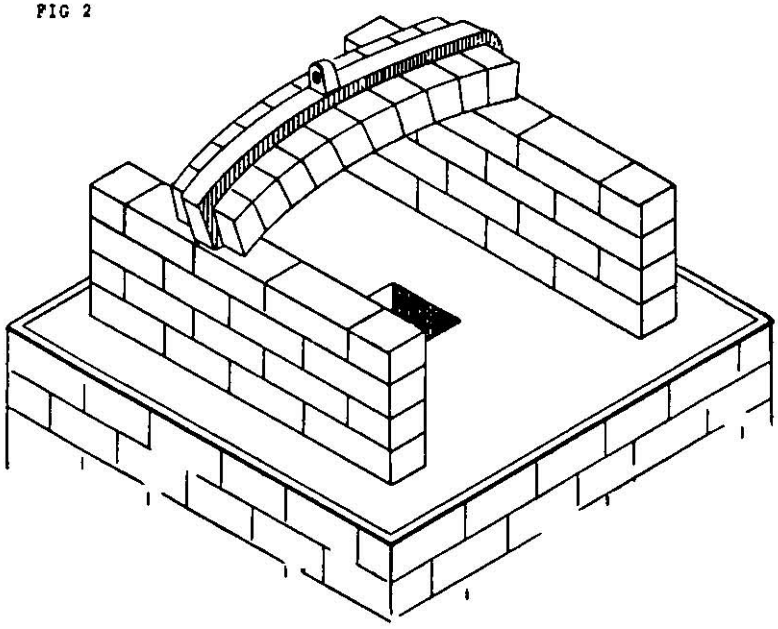


FIG 2



FORGES OR HEARTHS. PLATE 6

POT FIRE

FIG. 1 shows a method that is adopted for heating coal cutter picks which have to be hardened. Place bricks as shown leaving a narrow space about 30 ins. by 3 ins. through which the flame can rise. Next lay the picks on the bricks with the sharpened points over the flame. When the points become dark red, plunge into oil to harden.

This method was adopted after numerous experiments and proved the most successful.

In FIG. 2 is shown a method to heat coal cutter picks for sharpening. By arranging a few bricks to form a small furnace, the picks can be heated by placing them in and enclosing them by sliding a brick in front of the fire.

This method gives good results when large quantities of picks have to be heated. When using this method the picks are heated by the flame, and so do not burn, as sometimes occurs in an ordinary coal fire.

POT FIRE.

PLATE 6

FIG 1

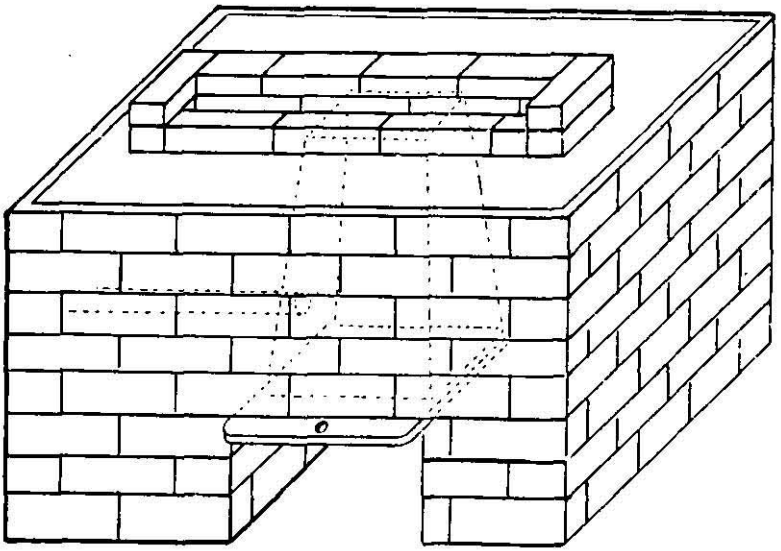


FIG 2