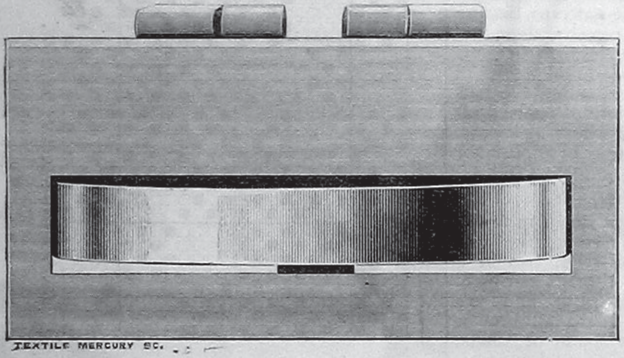
Machinery and Appliances.

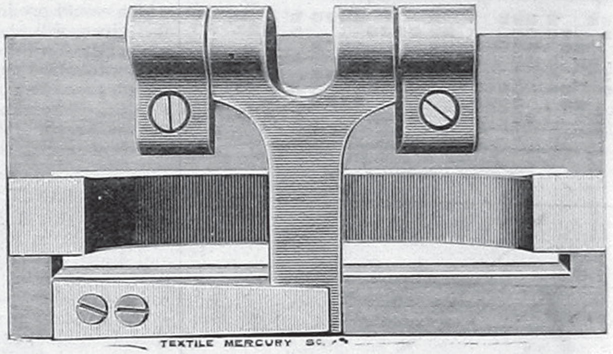
IMPROVED SHUTTLE BOX SWELL.

MR. J. WHALLEY, PATENTEE, CICELY BRIDGE MILL, BLACKBURN.

A very heavy item in the working expenses of a manufacturing establishment, especially in the cotton trade, is the great wear and tear of shuttles, pickers, and picking bands. These are grouped together and constitute "a tackler's stores" or the greatest part of them. The shuttle of course carries the weft through the warp, and considering the rapidity of its movement in these times of quick-running looms, it would form a very much more powerful simile by which to represent the rapid flight of time than in the days of Job, who wrote "My days are swifter than a weaver's shuttle." The wonder at the present time is that the destruction of shuttles by rapid wear, great though it is, is not greater than we actually find it to be. Still the cost is heavy enough, as every manufacturer knows. The picker is a well-known piece of the furniture of a loom. Its function is to project the shuttle from side to side of the loom through the open shed. As the shuttle is metal tipped and the tips have fine points, their destructive effect upon the pickers is naturally very great, and all the greater if the projection of the shuttle be made with greater force than is requisite for the purpose. This is certain to be the case if the loom is not kept in the best of order. The wear and tear of pickers under the most favourable circumstances yet devised has hitherto been an unavoidly large item of expenditure. Picking bands are strips of leather by which the connection between the picking stick and the picker, in a Blackburn or side-pick loom, is made. It naturally sustains a considerable strain, as by the movement of the picking stick it is made to project the shuttle across the warp shed by means of the pickers, the weight of which it has also to carry. This stroke is made in the case of each picker from 100 to 120 times per minute. The shuttle enters each of the two boxes of a loom this number of times. It will therefore be seen how important it is that the shuttle should be projected on its journey with just the proper amount of force, and neither more nor less, and that the picker in the box to which it is going should be in the proper position to receive it: that is for the point of the tip to strike right in the centre of the hole it has made. Should it strike otherwise, the shuttle will get banged about from side to side of the box, thus wearing it on the sides excessively. But if the picker has been drawn well back in the box the first check given to the motion of the shuttle is by its coming in contact with the shuttle box swell, and this is perhaps most frequently the case. Here comes into action the most destructive factor in the case. The shuttle having entered the box it comes in contact with the front of the swell, shewn in our illustration, Fig. 1. This deflects it from a straight course, and naturally throws its rear end sharply into contact with the side, from which it will next probably rebound against the front side before it is stopped. It is this knocking about which is so destructive to shuttles. In the fast-reed loom a very heavy burden is placed upon the shuttle, as it has to work the protector or stop-rod. In the loose-reed loom it is relieved from this, and there is therefore no reason why its working should not be made as easy as possible. All that is required is that the shuttle shall enter the box without rebounding, and be retained there and held with sufficient firmness until it responds properly to the projecting force. This duty is, or ought to be, performed by the swell, but in the old construction, which is still ordinarily in use, it is discharged very imperfectly, and hence the several attempts that have recently been made to improve its construction.



Front View.



Back View.

BAYNES AND WHALLEY'S PATENT BEVEL SWELL.—MR. J. WHALLEY, CICELY BRIDGE MILL, BLACKBURN.

We have pleasure in bringing before our readers a newly patented swell, the invention of Mr. J. Whalley, manager, Cicely Bridge Mill, Blackburn, which has already received the commendation of extensive adoption. Our illustrations shew front and back views. Its front view shews very little difference from the ordinary swell, but the back view exhibits its peculiar construction as being very different. The swell and the lever on which it is carried are cast in one piece, the upper part of the lever having lateral pivots, which rest in the brackets by which it is attached to the top of the shuttle box back as shewn. A flat spring, but much longer than the one shewn in the illustration, which is simply engraved from a model, presses it into position. This pressure is not great, being we should say almost the minimum necessary for retaining the shuttle in its proper position. It will be seen that suspended in the manner shewn the line of movement described when the swell is pressed back is a segment of a vertical circle. This is advantageous, as the result is to facilitate the lodgment of the shuttle upon the bottom of the box, always the best for its projection again across the warp. With the old form of swell this could never be assured, as should it be tilted up at either end, or raised altogether from the bottom plate, it would be delivered from that position, a fact which accounts for a good deal of the wear and tear of the shuttles and pickers. The inventor has also varied the construction from that shewn in our illustration by attaching the pendant bracket to a curved plate spring curved almost into a tube, the spring being attached to the shuttle box back by screws. This dispenses with the pivot ends, the small brackets, and the flat plate spring shewn, and also obviates any necessity for lubrication, and on several accounts may be preferred.

The new swell has already been thoroughly tested in Cicely Bridge Mill and many other places, there being already over 12,000 at work. In the mill just mentioned there are 614 looms averaging about 50 in. reed space, and making all classes of cloth, from the lightest to the heaviest picks. The total expenditure for the six months from July 1st to Dec. 31st in shuttles, pickers, and picking bands has been a sum which shews 2s. 1½d. per loom or 4s. 2½d. per annum. This has been accomplished under the disadvantage of the new swell having had to take over as it were the half worn stocks of these articles from the old swells. This is a result which shews a reduction of fully 50 to 70 per cent. per loom, as our practical readers can easily ascertain by making comparison with their own expenditure in the same time. But this is not all. There has been a considerable increase in the production, and an improvement in the quality, as owing to the fewer breakages of pickers there are less damages in the cloth, fewer oil stains, and less blacking of the weft. We were shewn one loom which had been supplied amongst the earliest with the new swell, and at the same time with new shuttles, both now a year and a half ago. The shuttles were not more than a quarter worn, and may certainly be expected to run three times as much longer. In the same loom the pickers had lasted six months, and the bands had done correspondingly well.

With a record like the above the new swell requires little from us in commendation. The inventor will be pleased to shew interested persons the new swell at work as described, and afford any other information that may be desired on application at the above mill. Messrs. Willan and Mills, Blackburn; J. & R. Shorrock, Darwen; and Howorth and Hartley, Haslingden, are licensed to make them.

THE "PYROS" COMBINATION FOR BOILERS.—It is well known that steam boilers are subjected to very destructive strains when the furnaces are first started for raising steam. This is due to the fact that those portions of the boiler surrounding the furnace quickly become highly heated, while the more remote parts remain for a long time comparatively cold Hence there is unequal expansion of the metal, and the consequence is that severe strains are set up in the boiler, which shorten its life and are otherwise very prejudicial. To remedy this Mr. C. E. Hudson, of Disraeli-road, Forest-gate, London, a naval engineer of experience, has devised a simple and ingenious system, which he designates the Pyros combination, and which has had a successful practical trial on board a merchant vessel. The arrangement consists in substituting for the present furnace fronts steel-heating chambers of the same strength as the boiler. These chambers, which do not in any way interfere with the grate surface, are at starting filled with water from the bottom of the boiler, or from any point in the boiler where there is no circulation. A small fire is lighted in the furnace at first, which heats up the water in the chambers, and by degrees the remainder of the water in the boiler becomes heated and the shell is also gradually warmed, a uniform temperature being thus attained.

During this period there is neither pressure nor steam used, and as soon as the circulation ceases by reason of the accumulation of temperature the heaters become auxiliary boilers, assisting the larger one. As soon as the temperature has become uniform the fires are made up and steam is raised to the working pressure. The primary work of the heaters having been accomplished, they are now used as feed-water heaters. The feed water, instead of going into the boiler direct, is diverted into the heaters and becomes heated to a temperature of 220° Fahrenheit. It will thus be seen that the arrangement is that of a combined automatic circulator and feed-water heater, which not only does not rob the boiler of steam, but arrests and utilizes heat which would otherwise be wasted, or rather worse than wasted, as it radiates into the stokehold, and in some circumstances renders it unbearable. The steamship on which the system has been at work for nearly two years is the *Cardiganshire*, a vessel of 3,700 tons. The results of its application are stated by the engineer in charge to be completely satisfactory. There has been no trouble whatever with it, and the temperature in the stokehold is found to be reduced by some 27°. A further important point is the fuel economy, a saving of 7 per cent. being shewn on the average of five voyages.

Bleaching, Dyeing, Printing, etc.

PAPERS ON BLEACHING.—I.

INTRODUCTORY.

Bleaching textile fibres is one of the most important of the many branches of the textile industries. Unless bleached, textile fabrics of all kinds have a very poor appearance, their colour being dull, of an unpleasant tint, and not even. Unbleached fabrics, moreover, cannot be dyed in pale bright tints, and when dyed they are liable to be uneven, some parts being dyed deeper than others, owing to the impurities in the fabric, natural or otherwise, preventing the dye from taking evenly on the material. Fibrous materials of all sorts, to fit them for being made into fabrics of the best kind, have to undergo a scouring or bleaching process to remove any dirt, grease, or colouring matter which they may naturally contain, or which they have acquired in any manufacturing operation through which they may have passed. These cleansing processes are generally included under the term "Bleaching." In the series of papers now about to be presented to the readers of *The Textile Mercury*, it is proposed to give a *resumé* of the various methods of bleaching the different textile fibres, cotton, wool, silk, flax, etc., which are in use at the present time. Necessarily in such a series there will be much with which bleachers will already be acquainted, but still it is hoped that in them some bleachers will find something with which they were not previously familiar.

The two most important fibres used in the production of textile fabrics are cotton and wool. These run one another a very close race for the first place, but it will generally be conceded that of the two cotton is the more important, and with the bleaching of cotton this series of papers will therefore begin.

BLEACHING OF COTTON.

Bleaching is of very ancient origin; when it was first applied to textile fabrics is uncertain, and cannot now be found out. What fibre was first bleached is also not known; probably it was linen, because this was the fabric most worn in early times, and in ancient books we meet with more frequent mention of linen cloths of fine quality than we do of any other fabric. The bleaching of linen had been early brought to a great state of perfection, more especially by the bleachers of Holland, who, at the end of the last century, had the reputation of being the best bleachers in Europe.

When cotton was first introduced into the Old World from America, there is no doubt what the methods of bleaching in use for linen were applied to cotton. Air-bleaching, assisted by washings and boilings in alkalies, was the essential feature of the process in use in the middle of last century; it was a long one, taking many months of time and requiring a much more sunny climate than that of England to carry out to perfection; there is no wonder then that Dutch bleachers should excel those of England, as their climate was much more equable than ours, while they had also much more sun, and sunlight is the potent factor in this process. This early process consisted in boiling the fabrics in weak alkaline leys made from potashes; probably they were steeped for some days in it, after which they were treated to a bath of buttermilk, followed by a spreading out in a field on grass for a week, when they were again treated to a ley bath and again spread out on the grass, these operations being repeated until a satisfactory white was obtained, which would take from six to eight months. Dr. Home, an Edinburgh physician, who had experimented in bleaching, proposed a weak solution of sulphuric acid instead of buttermilk, which was a great improvement, resulting in reducing the time to about four months. The alkali in use at this period was potash, soda being then unknown; lime was also in use both alone and mixed with the potashes. A patent of 1773 describes a bleaching composition made from kelp, barilla ashes, American potashes, fern ashes, calcined testacious shells, quicklime, cow dung, oil of tartar, and campanum—whatever that may be; the soluble portion of these was to be used. Chemical knowledge was very crude in those days, or it would have been seen that the desired result could be obtained by a much simpler composition. The discovery of chlorine by Scheele about 1782, and of its powerful bleaching properties, paved the way for a great improvement in the art of bleaching vegetable fibres, and fabrics made from them. The use of this body was first proposed by Berthollet in 1785; it was introduced into the Scotch bleach works by James Watt about 1789, and into the Lancashire bleach works about the same time, by Dr. Thomas Henry, a Manchester physician and chemist. At first the gas was used, the goods being hung in a large chamber and a current of the gas passed through (English patent No. 1,678, 1789). This, however, proving unsatisfactory, the gas was used in the form of a solution in water, in which the goods were steeped after being treated to a ley boil (English patent No. 1,872, 1792). Charles Tennant, of Glasgow, introduced in 1798 the use of a solution of chlorine gas in lime water, which was a great improvement, and a year later he introduced the dry compound of lime and chlorine—bleaching powder—in use at the present time. Air-bleaching, however, was not discontinued until some years after the introduction of bleaching powder, the process in general use at this time consisting of—1st, a steep in water; 2nd, a lime boil—in winter time two lime boils; 3rd, a boil in weak caustic soda; 4th, a caustic boil; 5th, exposure on the grass for a week; 6th, caustic boil; 7th, field again; 8th, treatment with weak chloride of lime liquor; and 9th, washing. In 1837 soda ash instead of caustic soda came into use, the process being introduced from America, and known as the "American process." It consisted in boiling the goods in lime, then souring with hydrochloric acid, and then boiling in ley. Scheurer Rott, a well-known bleacher of Alsace, introduced about the same time the following process:—1st, lime boil; 2nd, hydrochloric acid sours; 3rd, soda ash boil; 4th, soda ash boil; 5th, acid sour; 6th, weak chemic; 7th, acid sour; 8th, soda ash boil; 9th, chemic; 10th, wash. In 1839 the use of resin was introduced, and in 1852 a bleaching composition made of soda ash, resin, and lime, was patented by James Higgin. Since then up to 1886 very little alteration was made in the chemical part of the operation; in that year the Mather-Thompson process, in which caustic soda and carbonic acid were used, was introduced. Up to about 1828 the cloths were treated separately, but in that year Bentley introduced the method of stitching the pieces together, and also brought out a form of washing machine, by means of which the process was made a continuous one. In 1853 Barlow introduced his high-pressure kiers, thereby making a great improvement in the process, the goods being more thoroughly boiled and a better bleach obtained. In 1856 Pendlebury brought out his modification of Barlow's kiers; then came the injector kiers made by Jackson, and by Mather and Platt; in 1886 there was brought out the Mather steamer kier, and in 1890 the Bentz-Edeston kier.

(*To be continued.*)

FORMATION AND FIXATION OF PERMANENT DYES, GENERALLY TERMED FAST COLOURS, UPON COTTON.*

This paper, as indicated in its title, is intended not only to bring before you questions of what are fast dyes, but especially it is intended to promote discussion in order to elicit your views as to the commercial interpretation of the words "fast colours," as it is evident the word "fast" in dyeing and printing is either elastic or it must have a relative or comparative interpretation, otherwise I should confess it is very doubtful if there be any absolutely fast colours produced on the fibre. If there be I trust I shall bring them before you this evening. Probably we dyers have no ground of complaint against the commercial interpretation placed upon the words "fast colours," as in our every-day work we produce large quantities of fast work, commercially speaking, such work, withstanding all the influences which the very best work of a like nature is capable of withstanding for the uses to which it is employed, but not in all cases against the reagents of the chemist. Therefore, in order to follow my interpretation of the matter, I have prepared samples of dyed and printed goods now exhibited before you, beginning with the ordinary steam work and passing through some of the alizarine and other colours termed best fast work, also specimens of colours produced on the fibre, to which I shall apply very severe chemical tests in comparison with other dyes, and I shall invite any chemist present to come forward at the close of this paper and try if he can to disturb such colours by any reasonable or acknowledged test. For our purpose I have assumed that the word "fast" as applied to dyeing and calico printing is a very elastic term, and in order to bring you specimens which range from loose to so-called fast work, I would direct your attention to the ranges of printed goods on my left, which are the ordinary steam work printed in single, double, or treble colours. This class of work is known not to be fast work, although some of the colourings are sometimes fixed sufficient to withstand reasonable washing and exposure, while some of the colours, which simply impregnate the fibre, would, of necessity, wash out. In other words, the basic colours are sometimes fixed, while the non-basic colours when used are not fixed. As these samples are only exhibited as our starting point as shewing the variety of colours taken in loose work, I need not trouble you with any remark on this steam or loose work, but pass on to the second range of printed white goods grounds in the so-called fast or alizarine colours. These goods have a large demand for both home and shipping trades, and are recognised and accepted as fast work. It will be manifest to you that in all the floral effects the use of the most brilliant colourings are indispensable, and must of necessity appear with the alizarine colours in best fast work, but all such colours have to be fixed on the cloth so as to withstand all the usual processes of washing, soaping, bleaching, starching, etc., all of which these goods have to pass through after being printed, and all work so fixed and capable of withstanding such treatment is accepted as fast work. I am sure it would be an unreasonable interpretation to say that colours must be fast against the destructive reagents of the chemist who possesses special knowledge over the properties of such dyes, and so long as such colours withstand all the influences to which they are reasonably exposed, the public, I think, will accept it, but if you, as practical men, believe that this public acceptance leaves sufficient ground for chemical controversy, I ask you to make the feeling manifest in the discussion on this paper.

* A paper read by Mr. JAMES SHARP, F.C.S., before the Society of Dyers and Colourists.