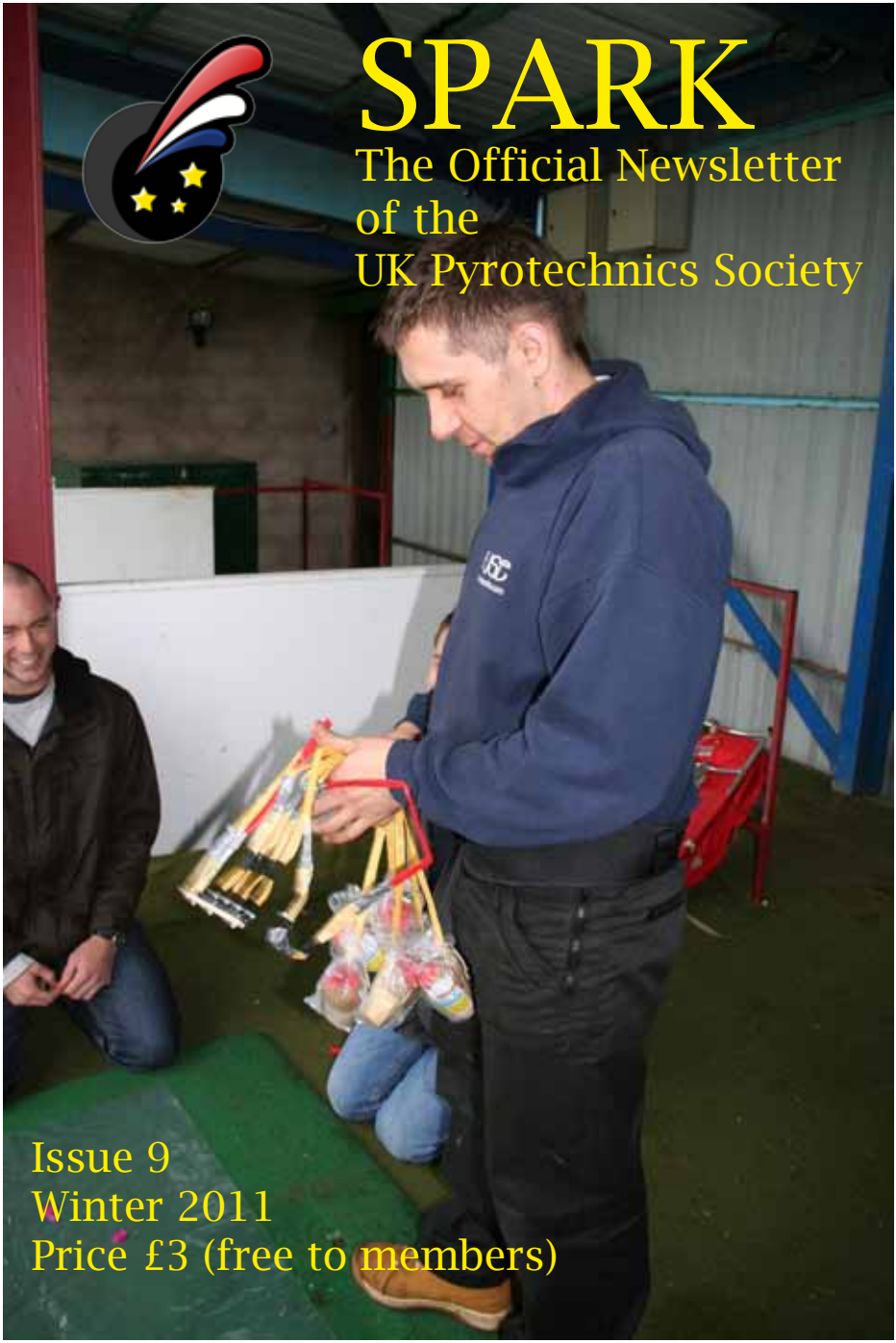

SPARK

The Official Newsletter
of the
UK Pyrotechnics Society

Issue 9
Winter 2011
Price £3 (free to members)

The **UK Pyrotechnics Society** is the only independent UK organisation that exists to represent the heritage, science, history and art of pyrotechnics in the United Kingdom.

The society was officially formed in 2006, and consists of industry professionals, academics, and enthusiasts of the general public.

We are not a trade association, but represent the interests of a very wide ranging, vibrant membership. If you are not already a member, we invite you to read the newsletter, visit our webpage:

http://www.pyrosociety.org.uk

and perhaps even consider joining our organisation?

Richard Harwood Bsc. UKPS Chairman

Front Cover - Photographs by Chris Dunford

Dean demonstrates fusing at UKPS training course.

SPARK - Issue 9

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From The Editor

Firstly, I must apologise for the late arrival of Spark 9. As some of you may know, my family & I have recently moved to Dorset and it's proving rather difficult to find enough time for UKPS business. It's also rather shorter than of late, but I thought it more important to get an issue 'on the news stands' than to wait for more material. I'm hopeful there will be two more issues this year.

This is set to be a critical year for the UKPS. I think I would go so far as to say a make or break year.

To some extent, we are waiting for the outcome of the ELR – but we have no idea when this will happen. If it goes for us, it may well breathe new life into the forum & society, if it goes against us – what then?

Richard's announcement that he is standing down will come as a shock to many. I would like to put on record my thanks for all the work Rich has done. He is the founder of the UKPS & the only one of the first group still to be involved. I'm sure he will continue to make valuable contributions, but we must respect his decision to take a step back.

We already have an excellent candidate for the position in the form of Steve Miller MIExpE, but there is still time for others to put their name forward and cause an election.

I am not putting myself forward as chair. I think it needs someone with a real vision for the future of the UKPS & at the moment I can't see what that will be. I'm still willing to stand as vice chair if I am wanted. As far as Spark Editorship is concerned, I'm willing to continue with this but I must have more support in the way of articles.

Christina continues to do the membership administration and run the shop, and is willing to carry on in this role.

We are currently planning this years AGM. Details will be emailed to members and announced on the forum. We are hoping for another top-notch speaker and we urge you to come along and bring anyone else who may be interested.

The keyword for this year must be involvement, it's not mine or Richard's or the Committee's society, it's the members society, and we need your ideas, involvement and passion to make it work.

Statement from the Chairman:

The following statement was posted by The Chairman late last year. Although some parts area little out of date now, it is an important summary of the current UKPS position:

Good morning everyone – I trust you all had a safe, enjoyable, and successful bonfire season. Some of you were probably fortunate to enjoy setting off some fireworks in the garden – I and I imagine a good number of you were out and about entertaining thousands of people firing professional displays all week.

We had our most recent management meeting last Wednesday – and there is one topic we feel that needs immediate attention: What is the current state of the UKPS and what should its point be?

I, and the other members of the board are agreed that we must continue to offer and actively encourage opportunities for training, personal/ professional continuing development, and advise on routes into the industry for those seeking to follow an interest or even a career in the pyrotechnics industries. It cannot be denied that, we, as the UKPS have not achieved what perhaps many of you would like to see: A permanent, tangible facility for usage by the membership to conduct research and possibly exploit commercial opportunities. Recent discussions have not gone unnoticed by the UKPS, it we felt it important to make an announcement.

To go back to my point about 'What is the current state of the UKPS'. Our articles set out our purpose:

"To preserve the heritage, science, history and art of British fireworks manufacture."

You will all be familiar with the Amberley project – despite a good deal of effort, we haven't realised the plans, and there needs to be significant investment of funding through donations, sponsorship, and also man power. Without these, the project won't go ahead.

"To promote and encourage pyrotechnics as a practical subject and science."

We believe there is a good deal of interest in pyrotechnics – and increasing use of fireworks at major events shows this. We are frequently contacted by the media to provide commentary and over recent months

our members have made several TV appearances.

"To promote the safe and responsible storage and use of fireworks by members of the general public."

All pro-firework bodies, trade associations and such would encourage this - us included. The leaflets produced by UKPS have found their ways into several specialist retailers - and we spend time talking with the public at events.

"To amass an archive of literature relating to many aspects of pyrotechnics."

We continue to accept historical items, articles etc - although it is not clear how these will be safeguarded well into the future.

"To clarify the laws relating to the manufacture and storage of explosives for our membership."

I think we are making very good progress on this one. The work done by Wayne Robshaw and several of us, with much constructive input from Danny has not gone unnoticed by HSE - we still await outcomes of this process.

"To establish the society as the liaising body with the HSE and other regulatory agencies in relation to the subject of firework construction by enthusiasts."

We have made a good start on this through our input into the MSER ELR process with HSE and other bodies involved. I believe there is a lot more we could do and this needs further discussion with our membership.

"To support the UK fireworks industry as a whole."

While the display side is well covered by the BPA, and retail by the BFA - anything we can do to spread positive messages and liaise with the trade, public etc can only be a good thing.

"To represent the general public in legislatory matters relating to fireworks."

We are well placed as an organisation to make representations in response to specific concerns. This must continue.

When you look at the UKPS, compared to the likes of the PGI in the US, we are a tiny organisation, representing a minority interest. Our greatest problems are a lack of funding, and a lack of man power. Without the

time of our members, or money – we are limited in what we can do. All of our activities require both. From organising events, attending public displays (firework champions events), organising meetings, publicity materials – the list is endless. Without the input of literally a handful of people, the current UKPS would grind to a halt overnight.

Our articles state that, every two years, we shall hold an election to appoint the principal officers of the society. Since 2006, I have held the position of Chair. 2012 is an election year and this means we will be writing to each of our full members to provide them the opportunity to stand for election as a principal or executive officer (Chair, Vice-Chair, Secretary, Treasurer.)

We need more people to actively contribute and engage in the running of the UKPS. With this in mind it is my feeling that a new Chairman should be appointed in 2012, and that person will take the UKPS forwards as an organisation, and through their leadership, and with support of myself and the board and membership, we will start to achieve the things our membership want. I strongly believe that a new chair would be a welcome change – I have held the position since 2006 – and I think this is largely because no-one else wanted to stand in previous years. I have decided I will not be standing for election in 2012 but would be pleased to continue to be involved heavily with the UKPS in a nonexecutive capacity.

Essentially the board feels it is vital that we must encourage new blood – and it is our hope that the UKPS will develop as an organisation.

I and the other board members remain fully committed to our aims and objectives – we are determined to see the ELR process through. What happens next is down to you all – our members.

I thank you all for reading this rather lengthy post and look forward to supporting our society in the years to come – so over to you!

We will be formally contacting all members to outline the process of elections soon. I encourage all of you to get involved and the make the UKPS – it is your society – you all have an equal responsibility to make it a successful organisation. What you get out is what you put in.

I suggest we use this thread as a starting point for you all to give your own thoughts, opinions etc.

Some observations and comments on commercial e-match fuseheads

by Dave Smith

Having just retired I have had a bit of time to compare different e-match fuseheads using a video camera. Unfortunately I do not have access to a high-speed capture camera, but I was quietly surprised that even at 24fps some useful comparison of the actual fusehead ignition could be made.

In the good old days I started using Vulcan fuseheads supplied by ICI. These were based upon a LMNR "flashing" layer coating the bridgewire, surrounded by the ignition coating of Potassium chlorate/charcoal (suspended in Amyl acetate / Amyl alcohol mixture, for dipping) and a layer(s) of Nitrocellulose lacquer (coloured midnight blue). These basically gave a nice spatter of hot, orange charcoal sparks.

Their Cerium fuseheads (LMNR/Cerium pyro mixture) were, as expected much hotter and ignited with a bright, white-hot fireball, much better for igniting more difficult to ignite mixtures. These fuseheads had a red nitrocellulose coat. In performance these are probably comparable to Davey-Bickford fuseheads.

To my knowledge,Vulcan and Cerium fuseheads are no longer manufactured.

The Fusehead is a crucial component in electrical ignition of fireworks and Special effects, along with their other use in detonators. For firework use this comes down to the ignition of Blackmatch (used in Quickmatch), Visco fuse, and possibly BP. Whilst all four of the fuseheads discussed may do the job of ignition (transfer of sufficient heat for sufficient time, to ignite the intended material), some may be more efficient than others.

No comparison of the electrical characteristics of the four fuseheads discussed here are made.

Fuseheads (all with 30cm of lead wire)

1) Davey-Bickford (Laminated board design)
2) Czech manufacture (Schaffler design)
3) Chinese? Sample 1 (Laminated board design)
4) Chinese? Sample 2 (Laminated board design)

Camera

Canon HDV 1080i (24fps)

Ignition source

PP3, 9volt battery

Method

The fusehead lead wires were held in place using Blue-tak on a thick black plastic sheet.
The recording was started and the fusehead fired.
Video files were transferred to Adobe Photoshop Premier Elements and individual frames exported as bitmaps. These were then converted to jpegs to reduce the file size.

Only one fusehead of each type fired (to save stock and time).

Each frame was therefore equivalent to a time of ~ 1/24th second, or 0.042 secs.

Results

To enable direct visual comparison, frames for all the matches are shown on one A4 sheet (see below).

Comments

1) Davey-Bickford (Laminated board design)
Bright, white fireball, with some sparks, main ignition event over in ~ 0.125secs.

2) Czech Fusehead (Schaffler design)

Bright, white fireball, more sparky than Davey-Bickford, main ignition event over in 0.125secs.

3) Chinese? Fusehead Sample 1(Laminated board design)
Appears less hot, orange charcoal sparks. Takes fractionally longer for majority of sparks to develop (0.083 secs) compared to the previous two fuseheads.

4) Chinese? Fusehead Sample 2 (Laminated board design)
At approximately 0.042secs close image inspection shows part of the fusehead coating to be blown off.
It can be seen this fusehead takes a relatively long time to start burning and has a long burn time, the main burn time is over after ~ 0.291secs, with residual board burning continuing after 0.458secs.
This is more of a burn composition rather than the flash composition of fuseheads (1),(2), and (3).
I would guess that it maybe "less sensitive" to impact / friction than the other fuseheads, but this is conjecture.

The Davey-Bickford and Czech fuseheads produce a white-hot fireball and sparks, compared to Chinese? Sample 1, a spatter of orange sparks (similar to the Vulcan fusehead by ICI), and a slow flame burn of Chinese? Sample 2. However all may satisfy their use for igniting fireworks.

My personal view is that all fuseheads should be used with the plastic protective shroud in place. However some users, as viewed on Youtube, do remove the shroud when inserting into a quickmatch leader. From this point of view, the laminated board design would appear to be a more robust design (compared to the Schaffler design) firmly holding the connecting wires rigid. The schaffler design, when not "shrouded" is perhaps more susceptible to bending the connecting wire leads (potential shorts), and derives most of its robustness from the plastic protective shroud, several types of which are available.

I would have liked to have tested some of the MJG Technology fuseheads, the J-Tec and M-Tec, and some from Martinez Specialities Inc, the E-Max, the No Lead version and the newer, "Greener" version, containing no chlorate, perchlorate or Lead. The MSDS sheets for the latter quote Bismuth trioxide and Boron as components. I would have thought this would have a very high ignition temperature, let alone the added expense of Boron.

I am sure lead free fuseheads will / are filtering down to the firework

trade, giving a “greener” product. This “green drive” is probably more important in stage proximate effects, fired in a theatre environment. Certainly LeMaitre I believe changed to a lead free igniter ~June 2007, (was it an MJG or Martinez product? – can anyone confirm?).

For those of you who “self dip” their own fuseheads, this technique could also be used to evaluate different formulations.

And if anyone knows of a cheap video camera capable of a faster fps, please let me know!

(Photos for this article on pages 12 and 13)

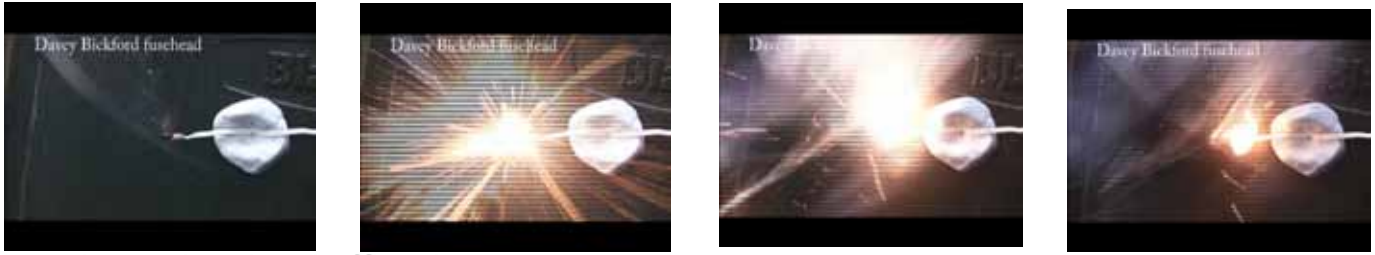
davesuejon@yahoo.co.uk

Firework Quote:

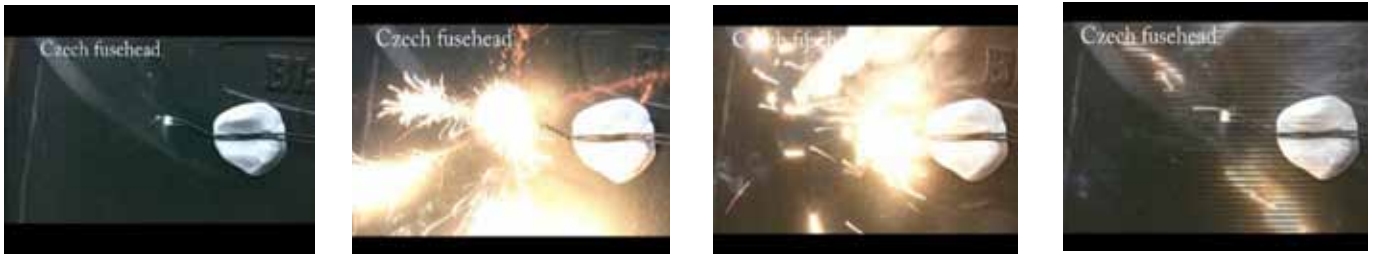
“I often use the word “joy” when describing fireworks. It is a considered word, deliberate in choice. Not just amusement, entertainment, astonishment, but joy. Our art makes us all into children again for a while. We become one in our experience for the moment; lost in the sound and color and light. We see large forces, stronger than we could ever be, yet beautiful in their effects. Sometimes violent, sometimes restrained. Delicate beyond imagination at times, coarse and rude at others.”

-Bill Withrow

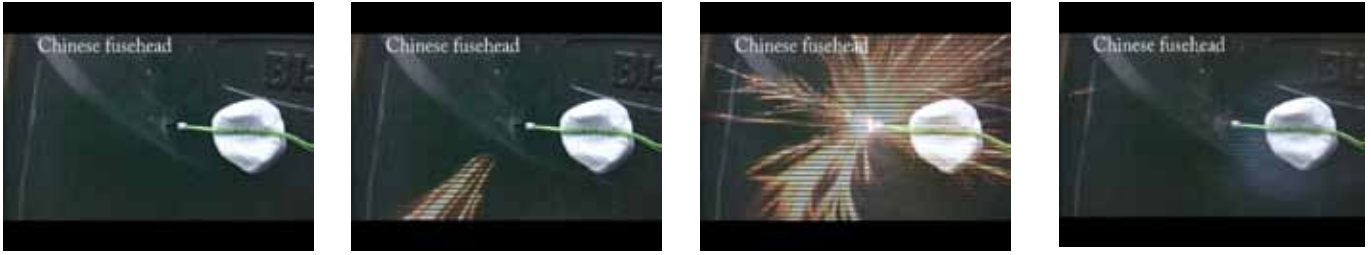
Davey-Bickford (Laminated board design)



Czech Fusehead (Schaffler design)



Chinese (?) Sample 1 (Laminated board design)



Time 0 0.042s 0.083s 0.125s

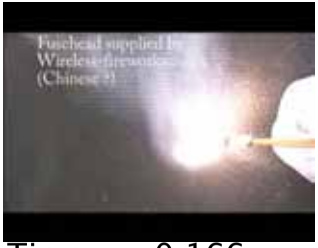
Chinese (?) Sample 2 (Laminated board design)

Time 0

0.042s

0.083s

0.125s



Time 0.166s

0.208s

0.250s

0.291s

Time 0.333s

0.374s

0.416s

0.458s

UKPS Training Course, October 2011

by Phil Dunford

Many thanks to Paul Dack and Dean Graham for organising a splendid training course last October.

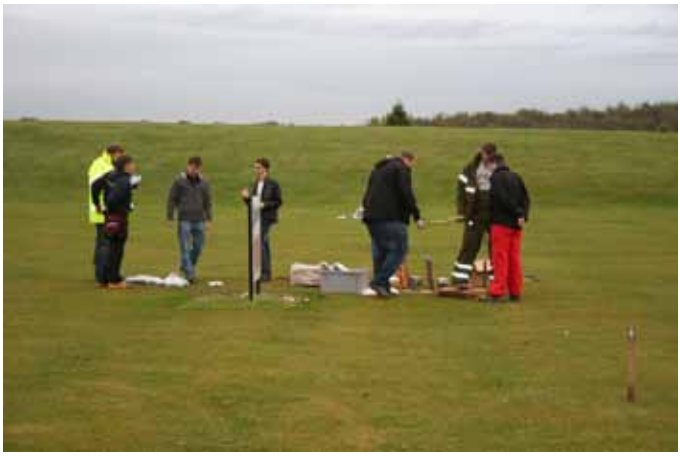
Paul had already organised a charity event at the Bondhay Golf Club Worksop and had the brilliant idea of combining this with a training course.

On the Saturday, attendees had the opportunity to help set up the CAT 4 display, under the supervision of experienced firers Paul and Dean.

On the Sunday, we arranged for Illuminate Consult to run their theory course which explains all the latest legislation and provides attendees with a useful certificate (after a rigorous exam!).

We see the provision of training as one of the key areas of UKPS activity & hope that we will be able to run at least one similar event some time in 2012.

Dean Demonstrates



News From Amberley

By Phil Dunford

I'm afraid that although most people we talk to love the idea of the Amberley project, we have not yet raised sufficient funds to make it a reality.

More worryingly no one has come forward to help with the ongoing work and Chris and myself are not willing to go it alone any longer.

We have had lots of help when we needed to recover the buildings (thank you everyone) but the work now is to raise money, do administration and (should it be built) to run the exhibit for many years to come.

I cannot currently see where this help will come from and reluctantly feel that unless the situation changes considerably in the next few months, the project will have to be abandoned.

This would be a great shame, as a lot of work has gone into it.

We need someone to step forward and share the leadership of the project and someone to drive forward the fund-raising. Chris and I still want to be involved, but are not a position to put in as much time as we have in the past. Also since our move to West Country it will take us a lot longer to get to the site.

So, over to you, or this will be the last 'News from Amberey'.

TONS OF FIREWORKS.

A VISIT TO MESSRS. C. T. BROCK AND CO.'S FACTORY.

BY F. M. HOLMES.

MOST boys would like to go there. It is a large field at South Norwood; and, unless you were told, I doubt if you would ever guess what was being made there.

Women Leaving Work.

Is this silent meadow, fringed with trees and dotted with sheds, a firework factory? Yes. It is the largest in the world.

Here are made those wonderful set-pieces that have raised so high the reputation of the Crystal Palace displays; and here are made those thousands of squibs, crackers, Roman candles and other fascinating brilliancies which will yield so much delight in the dark evenings of November.

Making Crackers.

There is good reason for the little sheds. Should an explosion or a fire occur, the damage is limited to the small building. One afternoon, some years ago, a partly-made rocket went off with a fizz, and in a second the air around was full of whizzing rockets. You would have liked to have seen that display, wouldn't you? But had you been there, you would have done what all the men and women employed here do in such rare circumstances; you would have caught up the nearest bucket, no matter what part of the field you were in, and hurried with it full of water to assist in quenching the fire. Buckets full of water are conveniently hung at the corners or by the doors of the sheds; and tanks and hydrants are fixed near by, so that plenty of water is at hand. But, happily, the precautions are so effective that an accident rarely takes place.

Then if your sister was with you she would probably have noticed before this, that all the women engaged in rolling or filling the lighter cases for the fireworks, are dressed in loose serge, and wear curious, light-coloured, rather sprawling, leather boots. Then you notice that the men are also similarly attired. You see these great boots in the store-shed, and in the magazines, and—now that your attention is for a moment diverted from the fascinating fire

Relieving

works—you see that all the floors are covered with linoleum.

What do these things mean? Are they all matters of chance?

By no means. They are deliberately used by design. The serge is non-inflammable, the boots, which can be slipped on over the wearer's other

shoes, are all sewn and have not a trace of iron brads in their constitution, for iron might cause any firework composition dust to strike into flame; while the floor is covered with the linoleum so that none of this dust can fly into the crevices of boards. Moreover, linoleum can be swept and washed more easily. Cleanliness is most important; no dust, grit, or cobwebs can be permitted.

Glance now some distance across this many-acred field and you will see a fence, and beyond it several iron buildings long distances apart, with tall screens of iron around them. These are magazines for storing finished, or nearly finished, goods. Thousands of pounds of explosives are kept here; while not far off you will see, dotted here and there, sloping roofs just rising from the ground. They might be low double cucumber frames, only there is no glass in them. These are the tops of small underground magazines, where also explosive goods are carefully stored. All these magazines and sheds are connected by tram lines running over the field, and goods are conveyed from one to another in closed boxes, or trunks, covered by tarpaulin. Still further, the firm have floating hulks in the Thames, twenty miles or more below London Bridge, where further explosives are stored, and another factory at Harold Wood, Essex, with depots at other places.

Men Leaving Work.

Filling Lances.

Crushing Saltpetre.

You see, then, that firework-making by Messrs. Brock is an immense business, and that an infinity of precautions are adopted to avoid accident. You think, perhaps, that Brock's came into existence with, or for, the Crystal Palace. Not so. The firm was founded long before the Crystal Palace was thought of. It was established indeed in 1725, and takes contracts for firework displays all over the world. When the North Pole is discovered, I should not wonder if they give a display there with a set-piece of England, and America, and Norway joining hands in the discovery. The Jackson-Harmsworth Expedition took out a supply of fireworks, we believe, with this object.

But the fireworks, you ask, how are they made? In a sense they are made as you try to make them. A paper case is rolled up and filled with the composition. But what composition? Ah, there is the secret. I cannot divulge it. Of course, chlorate of potash is sometimes used. You can guess that I suppose; also sulphur. But chlorate—as the first is called for short—is such a fiery fellow, and dislikes the yellow sulphur so much, that an explosion is very likely to occur if the two get much together; therefore, at Messrs. Brock's, they are kept entirely apart. Here is a chlorate mixing shed, there is a sulphur room. You might remember that fact in your own chemical experiments and firework doings. Some mixtures, if not all, have to be rubbed through sieves to render them fine and powdery and mingle them well; and then they have to be rammed pretty hard in their respective cases.

Each mixing-room has its relief shed. When a batch is mixed it is taken off to this shed, so that

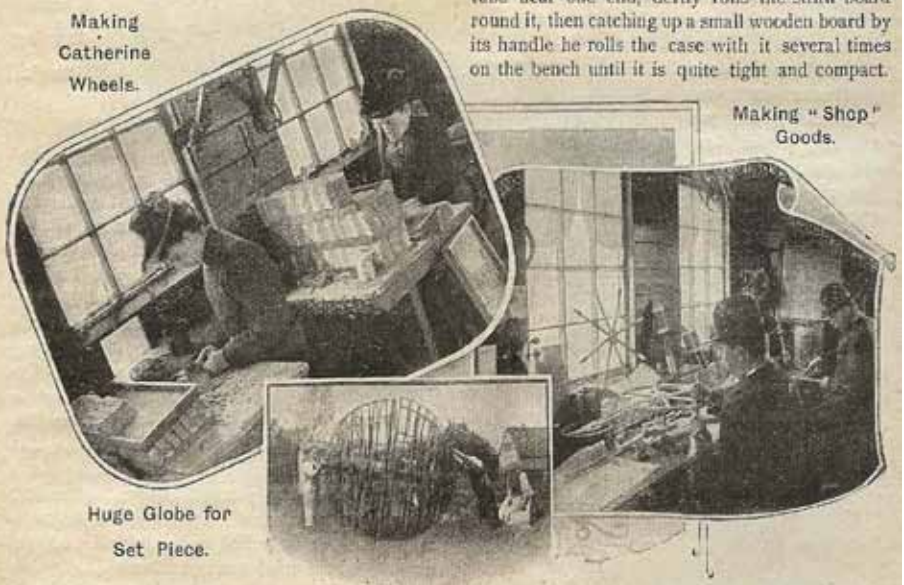
should an accident occur, it is limited to the quantity in hand. Here in one room is a boy punching out stars. The punch is, briefly, something like a small hollow tube fitted with a spring which can instantly release the material caught in the hollow of the tube. The composition lies before the lad on a bench, perhaps moistened with methylated spirit, and he dabs his punch in it; then releases the quantity he takes up and the little grey-black mass, which will by-and-by shine out as a brilliant star, falls out. It is done with a quick movement of the wrist and backward and forward movement of the hand, almost as fast as the eye can follow it. The stars are dried in rooms warmed by hot-water pipes. You will notice in every room that the quantities with which the men are working are small; the reason being, of course, to limit the damage of an explosion should one unhappily occur.

But while the compositions are being prepared in various sheds, the cases are being made. Here in one room are young women rolling up tubes fast as their lissom fingers can fly. They hold a little ferrule or mandril in the right hand, and with the other, move the slip of paper from the heap on the bench near by. The ferrule is placed near the centre of the paper, the end curved over it, the paper rolled around it and the end kneaded up. Behold a case for a lance in the twinkling of an eye! The lances are the little coloured lights used so largely for set pieces. The production of cases or paper tubes in this way is called dry rolling for small goods.

To see case-making for larger goods we enter another shed. A thick paper or card called straw-board is being used. A lad with a brush covers the length of the straw-board with paste, pops down one or two strengthening pieces towards the middle and passes it on to the man who rolls the case. Swiftly the man places a piece of brass tube near one end, deftly rolls the straw-board round it, then catching up a small wooden board by its handle he rolls the case with it several times on the bench until it is quite tight and compact. It will dry in a short time as hard as wood.

By this time the boy has spread another piece with paste, and the man continues his rolling; but the cases, before they dry hard, have to be choked. A piece of small cord is twisted by another man round the case not far from the top, and then, one end of the string being fastened to the bench and the other held firmly, and the cord drawn tight, the case is passed briskly backwards and forwards along the string, the part twisted round it compressing it deeply, and narrowing the aperture to a small neck. The reason for choking is, of course, to cause the composition to rush blazing forth with greater power, and so if necessary to force the firework backward or upward.

(To be concluded.)



Making Catherine Wheels.

Making "Shop" Goods.

Huge Globe for Set Piece.

About “Tons of Fireworks”

This old article is taken from a rare children’s book called “Childrens Friend” for the year 1899.

Many thanks to Keith Brock for finding it. Thanks also to Eric Kings of the Norwood Society and Brian Porteous for donating the book to the society.

TONS OF FIREWORKS.

BY F. M. HOLMES.

(Concluded from p. 170.)

SUCH choking assists serpents in moving, large wheels in twisting, and rockets in rising upward. In some of the larger fireworks a choke is produced by forming at the aperture a ring of pressed clay. Furthermore, rockets are made with a hollow space in their composition three parts or so of the way up the case. This is accomplished by inserting a wooden ferrule of the required length, and ramming the composition round it, after which the ferrule is withdrawn.

The papers for the cases are all cut to size for the respective fireworks before coming to the rolling-rooms. Three hundred tons of paper are used in the course of the year. Shells are made in half-spheres, the material being layers of strong paper pasted one over the other, until the required strength and thickness are reached. They look like the halves of cocoa-nut shells. But some are much larger, the largest being no less than 25 inches in diameter. What a mighty bang that would make! Aye, and what quantities of beautiful stars it will throw out.

The lower part of a shell, *i.e.*, the flame cone, is filled with the lifting charge—the explosive that sends the shell soaring into mid air; then comes the bursting charge that rends the shell asunder when high above, and discharges the coloured stars, or other firework fancies that look so brilliant and pretty far aleft. The fuse to reach the bursting charge must be very nicely timed, so as to set free the stars as soon as the shell reaches its proper height.

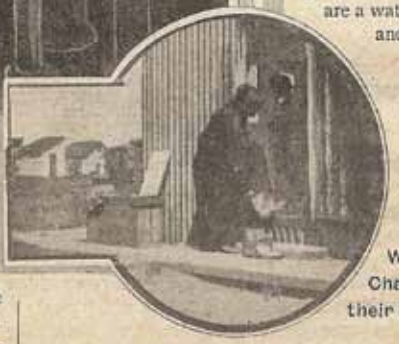
No doubt Messrs. Brock use various fuses and touch-paper for various work, but they will not

mind it being known that the fuse for connecting parts of set-pieces together consists of cotton-wick, soaked in a composition of gunpowder and starch, and then hung on a frame to dry. You can imagine how rapidly this will burn and set the piece afire.

But the composition being mixed and the cases prepared, then comes the filling. Glance at this shed. Here are three or four women filling Catherine-wheel cases. You will notice the long pipe-like case is held firmly, but lightly, in a vice worked by the foot, a funnel is placed in the top of the case, and a little composition poured down. Then a thick iron wire is used to ram the composition tight. More of the mixture follows, and again the wire is used, and so on, until the case is full. In another shed rockets are being filled in much the same manner by means of a funnel, but the composition is beaten hard by a mallet and wood.

A Fire Balloon.

Bombs and Mortars.



Women Changing their Boots.

In yet another shed you will see women twisting the long Catherine-wheel pipes round the central piece of wood to make the familiar wheels, and fixing them by bands of paper; in other sheds you will see rockets or Roman candles being papered and finished. Altogether there must be something like a hundred different sheds on the ground, the work being dispersed over these, instead of being concentrated in one huge building. The gas jet to illuminate each shed is placed outside, near the windows, so that no match or light of any sort shall be used within the buildings; while each rocket, or similar work, is passed through a door to a box outside the building when finished, so that should one explode while in process of manufacture the others are out of harm's way. Wherever you turn, indeed, many varied and useful precautions are in operation, while to guard the premises at night are a watchman and two large, powerful, and well-trained dogs, who would give an account of an intruder highly unsatisfactory to himself.

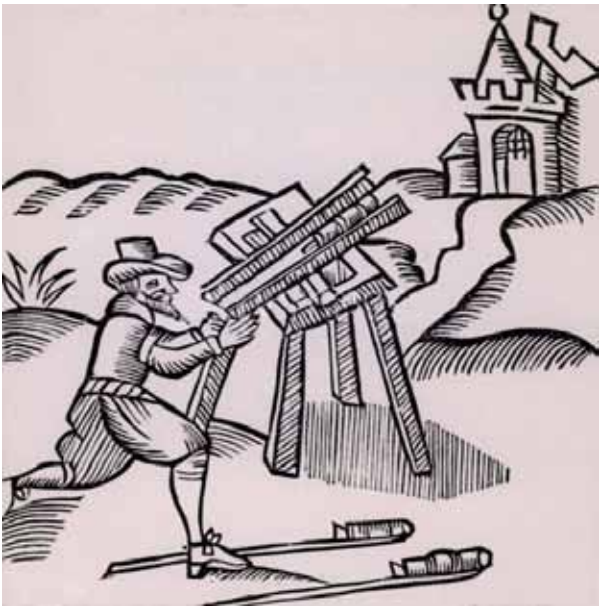
Much more might be added, but enough has been said to indicate the remarkable interest and variety of the operations of this famous manufactory.

UKPS Addresses

UKPS Registered Office:
Richard Harwood,
17 Manor Drive,
Mirfield,
W Yorks,
WF14 0ER.
Email: chairman@pyrosociety.org.uk

Membership Secretary:
Christina Dunford,
Angel Lane Cottage
Angel Lane
Stour Provost
Dorset
SP8 5LU

Email: membership@pyrosociety.org.uk
(Please DO NOT use any previously published addresses)



Luigi cracks and turns on ye olde H.S.E.

Answers to Spark 8 Crossword

The Green Man is taking a break, so there is no crossword in this issue

We welcome any firework related articles for publication.
Please send to:
editor@pyrosociety.org.uk

Remember to visit the Website and Forum for up to date information
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