

## The Protector Lamp & Lighting Co Ltd

A brief survey of the development and manufacture of miners safety lamps, by Frank Johnson.

The Protector Lamp Co. when formed took its name from the type of safety lamp that it was going to manufacture. A 'Protector' lamp is one in which the flame would be automatically extinguished if an attempt were made to take it apart whilst still lit. This is a very desirable feature in a miners lamp since the presence of naked flames in coal mines is potentially very dangerous, as explosive mixtures of firedamp (methane) and air are often found. Thus, from the middle of the nineteenth century there have been numerous patents on various ways of achieving self-extinguishing lamps.

The Protector Lamp & Lighting Co. Ltd was founded in 1873 and took over the patents and business rights of W.E. Teale, an oil and lamp manufacturer who himself became the works manager of the newly formed company. Teale had already patented (UK 3289/1869) a 'protector' type lamp (fig. 1) an example of which is in the present Protector Co. collection (No 123). Shortly after the company was formed Teale patented an improved type 'protector' lamp (UK 2914/1874) which was made on a large scale in the early days and is shown in the 1914 Protector catalogue as 'the old type Protector lamp (fig. 2). Various manufacturers subsequently made lamps featuring this type of extinguisher well into the middle of the 20th century. The disadvantage of this type was that they had to be hand lit before assembly which presumably led to the development of the internal low voltage lighter used on later lamps.

Whilst Teale was manager, the company also produced illegally, Howat's deflector lamps (fig. 3) which had been patented in 1886 (UK 1709). A subsequent court action led to a royalty being paid to Howat and to his appointment for a short period, as works manager, during which time more of his lamps were produced. Simultaneously the company also produced 'Thomas' lamps under licence. Towards the end of 1889 Teale, who by this time was on the board of the company, was removed from the offices of director and Managing Director.

Also at the end of 1889 Joseph Prestwich was engaged as Traveller but within a year was appointed as development engineer to the company. It would appear that he had been engaged in development work prior to his appointment since a patent (UK 18226) dated November 1890 was granted bearing his name. This patent described the protector system as used in successful later lamps.

The appointment of J Prestwich as development engineer (and shortly afterwards director) heralded a new era in Protector history. Between 1890 and 1914 a considerable amount of research was carried out although at the start he seems to have produced a number of lamps which were more or less copies of existing lamps such as Jack Davy (which were out of favour by this time), Ashworth-Hepplewhite-Gray and Thorneburry lamps which can be seen in the Protector collection. As a result of his work a number of patents were assigned to J Prestwich/Protector between 1890 and 1914.

One of Prestwich's early research topics which went on for a number of years was the development of a Thorneburry type lamp. This is a Mueseler lamp which has a double glass, the air passing to the flame via the space between the glasses and through a gauze at the bottom of the lamp. In this way the flame receives clean air continually. This type

of lamp was considered to be very safe. (see collection No 10). Protector made their own versions of this lamp and examples are shown in the collection (90 A, B, C) but there is no evidence of them being produced on a large scale. Eventually, Prestwich produced a double glass lamp, which seems to be a cross between a Thorneburry lamp and the later HCP lamps, and was based on his patent UK 16753/1905, UK 10,037/1906. Examples of this lamp are shown in the old 1914 catalogue (fig. 4) and in the lamp collection (92 A,B, & 93).

Concurrently with his work above, J Prestwich experimented amongst other things, with lamps that incorporated electrical lighting features. This meant that the lamps could be assembled completely before lighting. The first successful model was the BL (bottom lit) lamp described in UK patent 3785/1893. This was a spirit (Colzaline) burning lamp which could be lit by applying a low voltage (2v) current across a platinum filament adjacent to the wick. The current was applied to the frame of the lamp (fig. 5). This was a very successful lamp and was produced up to the 1950's.

A later equally successful variation of this lamp was the SL (side lit) type (fig 6), in which the current was applied to the filament via the frame and an insulated metal ring around the base of the glass. The SL type was easier to construct than the BL and was produced regularly until the 1970's, being occasionally requested today. It is described in UK patent 16039/1909.

Whilst the double glass, SL and BL lamps were being developed a large number of experimental lamps, probably in excess of one hundred, were also made, many of which can be seen in the Protector collection. However it is known from old photographs that the collection is far from complete. Most of the lamps would have been obsolete after 1914 since they would not conform to one or more of the new criteria laid down for miners safety lamps by the 1911 Coal Mines Act. These criteria are shown in a document entitled 'Coal Mines Act 1911-Test of Safety Lamps-Memorandum', dated 6<sup>th</sup> February 1913. The main points were:

1. all lamps must have double gauze's or arrangement serving the same purpose i.e. Marsaut and Mueseler lamps acceptable but not Clanny lamps.
2. A straight edge put between the outside of adjacent pillars must not touch the glass- this rules out most lamps with only four pillars.
3. Lamps must be so constructed that they cannot be assembled without the gauze's.
4. Lamps must have an efficient locking device to prevent removal of oil vessel, glass or bonnet by unauthorised persons. This excludes screw locks.

Following the implementation of the 1911 Coal Mines Act, there were only two Protector Co. safety lamps on the approved list for general use.

They were (i) Prestwich Patent Protector-this was a BL or SL type.

(ii) No 176 oil-this was a simpler lamp (fig. 7) with a pricker wick adjustment, sliding hand lead rivet lock, and had no protector system.

The 'Prestwich Patent Protector A' was also approved for use by officials-this was a BL or SL type which could be made wholly or partly of aluminium and could have copper gauze's if used for surveying. Lamps with aluminium parts were discontinued in the late 1950's for safety reasons. No other Protector lamps were on the approved list until May 1916 when the Prestwich Patent Protector 08 lamp was added to the list. This according to the government publication SRO 341 was similar to the BL/SL types but had

a slightly wider gauze and could take a taller glass. However amongst the lamps in the collection there is one which is stamped 'Protector 08' which is completely different having the frame fixed to the reservoir and is hand lit (collection No. 89C)

After about 1914 no new lamps were produced or patented until about 1929 when Protector type 6 lamps emerged. These are lamps with a flint ignition device which in the prototype was activated by rotating the reservoir (see No 101 in collection and UK patent 329288/1929). However, an improved flint lighter was designed which used a striker key and was much simpler in construction. This system was patented (UK 344812/1929) and was the basis of the system used on Type 6 lamps today (fig. 8). Examples of the earlier lamps can be seen in the collection Nos. 102-106.

In the 1930's electric lighting was being used increasingly in mines, which easily surpassed flame safety lamps in brightness. Consequently new standards of lighting were applied and new regulations came into force-Safety Lamps (Conditions of Use) Order 1934-under which safety lamps which were considered bright enough to be used continually at a coal face fell into a new category-Schedule A. Most of the flame lamps in use at this time did not fit into this category and were put into another category-Schedule B. Lamps in this latter group could only be used by workers not at the coal face nor loading stations, and , if they were fitted with self contained lighting devices, could only be used by officials.

This led to more research and the development of high candle power (HCP) lamps which would fit into Category A, and a number of firms produced such lamps. Protector themselves developed a series of lamps the most successful of which was the type 33A (fig. 9 and No. 97 in collection). The CT33A was a Mueseler type lamp with an inner glass combustion tube suspended from the chimney. Production of this lamp started in 1935 and went on into the 1950's.

The advent of Schedule A high candle power lamps did not prevent the further development of lamps which now fall under Schedule B and a number of new lamps were developed and manufactured by Protector. The first of these, in the 1930's was a lamp designed for Manchester collieries which was designated type MC40 (fig. 10 and No 89A in collection). This was a bonneted Marsaut lamp which had the frame fixed to the reservoir and the bonnet was locked by a magnetic lock on one of the pillars. The lamp burnt heavy oil which necessitated the use of a high tension lighter. These lamps were made until the 1950's

After this there appeared to be a lull in further lamp development until the late 1950's when a series of lamps were produced based on the Protector Type 6 lamp (see above). These were types 59, 6RS and 6GRS Type 59. This design was patented by Protector in 1958 (UK 841,036). It is a low voltage lit lamp in which the lighting filament is rotated over the wick and a current passed, supplied by batteries in the base of the lamp. The lighter is operated by pushing a striker key similar to that on a type 6 lamp. This system was thought to be safer than that on a conventional type 6 lamp since the wick on the latter could (in theory) become impregnated with flint dust from the lighter, which would affect the flame. Before the final design was arrived at, earlier prototypes had been objected to by Naylor's of Wigan who claimed that their patents were being infringed. After lengthy discussions between the Protector board and Naylor's from 1957 onwards the type 59 was made. It was then produced for the NCB who considered that

Naylor's patents were frail and not infringed. Examples of type 59 lamps and prototypes are in the collection Nos. 116-118 inc.

Type 6RS. This a type 6 lamp which has as aspirator ring and inlet fitted into the bonnet. This allows air samples from a probe to be fed to the lamp to determine the methane content (fig. 11). These lamps were made from the early 1960's and are still in production.

Type GR6S. This is a modified type 6 lamp usually referred to as a Garforth lamp. Samples of air taken by an aspirator bulb can be injected into an inlet in the side of the lamp below the glass to determine the amount of methane present. This system was invented by UK patent 1048136/1964. Manufacture of these lamps started in the late 1960's and they are still in production today.

In addition to all the research and development described above Protector have had close associations with two other firms.

- i The Miners Lamp Electric Lighting Co. Leeds. Protector were approached by this company in 1891 with regard to manufacturing MLEL Co. lamps and in 1892 an agreement was reached. At first it would appear that lamps were made under licence since royalties were paid but later on it would seem that they were taken over by Protector as in 1913, the Protector board wound the company up. This would also explain why the lamps were marked 'Miners Lamp Electric Lighting Company Monton', and not Leeds. Four of these lamps are in the collection Nos. 20-23.
- ii Johnson, Clapham & Morris. This firm made lamps from the 19<sup>th</sup> century. Protector manufactured some of their styles of lamp. In the 1950's J.C.M. stopped making lamps and the manufacture of J.C.M. lamps was carried on by Protector and examples are shown in the collection Nos. 94-96. One type of J.C.M. lamp is still manufactured today (fig. 13).

Finally, a word about the position of flame safety lamps in mines today. Since electric lighting is largely used in most mines today, the use of flame lamps for general illumination has ceased and they are now used mainly for inspection and gas detection. For general gas detection they have the advantage over methanometers, which detect only methane, in that they can indicate the presence of other gases and a lack of oxygen. Thus they are still valuable instruments.