

**FILES, FUSES, AND LOW WATER ALARMS.**

Our extracts from Knight's "Mechanical Dictionary,"\* this week, include illustrations of all the different forms of files, of a variety of fuses, electric and otherwise, and of a number of ingenious low water alarms.

Files are graded by shape, size, and fineness of cut; and also are known by their purpose. As to shape, the series of sections given in Fig. 1 will be readily understood. *a, b, c,*

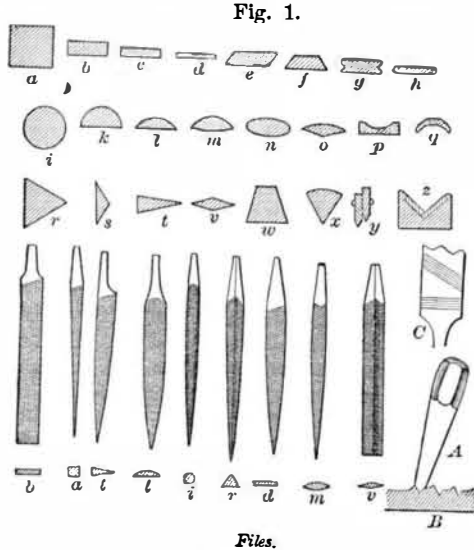


Fig. 1.

Files.

*d, e, f, g, h* are sections derived from the square; *i, k, l, m, n, o, p, q* are derived from the circle, and *r, s, t, v, w, x, y, z* from the triangle. The files represented in the succeeding engravings are known as follows: *a* is a square file, parallel or taper, sometimes with a safe side; *b*, when large, is a cotter file, when small, a verge or pivot file. *c* is a flat file; when small, a pottance file; when narrow, a pillar file. *d*, when parallel, is an equaling, clock pinion, or endless screw file; when taper, a slitting, entering, warding, or barrel hole file. *e, f* is a French pivot or shouldering file; when parallel, a V file. *g* is a nail file for the finger nails; *h*, a pointing mill saw and round edge file; *i*, round, gulleting, or rat edge file; *k*, frame saw file; *l*, half round, nicking, piercing, or round-off file; *m*, cross file, double half-round file; *n*, oval file; *o*, balance wheel or swing wheel file, the convex side only being cut. *p* is a swaged file for finishing brass moldings; *q*, a curvilinear file; *r*, triangular, three square, or saw file; *s*, cant file, for filling inside angles of 120°; *t*, when parallel, is a banking or watch pinion file, when taper, a knife edge file. *v* is a screw head, feather edge, or slitting file; *w*, a valve file; *x*, triangular-and-half-round file; *y*, double or checking file for gunsmiths; *z*, double or pencil-sharpening file.

As to character of teeth, the classes are: Double cut, having two sets of teeth crossing obliquely; single cut or float, having but one row of teeth; rasp, having detached teeth made by a punch instead of a chisel. At *A* is shown the position and action of the file chisel on the blank. *C* shows the appearance of the rows of teeth. The following table gives the approximate number of cuts in an inch of file:

Length of file in inches.....	4	6	8	12	16	20
Rough.....	56	52	44	40	28	21
Bastard.....	76	64	56	48	44	34
Smooth.....	112	83	72	72	64	56
Superfine.....	216	144	112	88	76	64

Figs. 2 and 3 represent a

**FILE CARRIER AND FILING BLOCK.**

Fig. 2.



File-Carrier.

The first is a tool holder like the stock of a frame saw, and is used to mount a file in a similar manner. The file block is of suitable wood, and is gripped in the jaws of a vise. It has grooves of varying depth, in which small rods, bars, or wires may be laid, to be filed conveniently.

Filing-Block.

Fig. 4 represents different kinds of

**FUSES.**

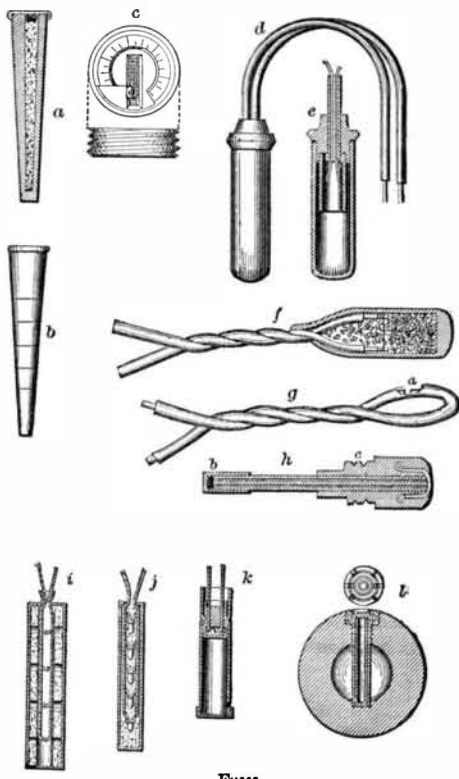
*a, b* is the common wooden fuse for shells. It is filled with a slow burning composition, and for use a part is cut off at the smaller end, the amount removed regulating the length of time which the fuse burns, and consequently the duration of the period prior to the bursting of the shell to which it is attached. *c* is the Bormann fuse, which consists of a disk of an alloy of tin and lead, in which a deep channel is made to receive the composition. At the end of the channel is an aperture communicating with the exploding charge. A cap covers the disk, and is marked to indicate seconds and fractions of the same. To use the fuse, the outer covering is perforated at any desired mark, when the composition ignites by the flame from the gun passing through the aperture made, and burns until the magazine inside is reached. Bishop's electric fuse, *d, e*, comprises an inner and outer cylinder, protected by a perforated cap, through which the insulated conducting wires pass. *f* illustrates another form of electric fuse, in which the ends of the conducting wires are united by a fine wire of platinum. This last becomes highly heated

when the current passes, and so ignites the powder. The operation of Statham's fuse, *g*, depends on the fact that a copper wire, covered for some time with vulcanized rubber, becomes coated with a layer of sulphide of copper, which is a moderately good electric conductor. This is utilized by twisting a piece of rubber-covered wire into a loop, when part of the covering is removed (at *a*) and the wire severed. Consequently, when a spark is passed along the wire, on reaching this spot it must follow the film of sulphide adhering to the rubber; and the resistance which it has to overcome causes the sulphide to ignite.

*i, j, k* illustrates Shaffner's blasting fuses and cartridges. *i* is a hollow cartridge provided with central and diverging spaces, occupied by a series of fuses and loose nitro-cotton, the whole covered with a waterproof casing, into which the ends of the conducting wires pass. In *j*, the main wires pass to the mine or cartridge, and are connected by smaller wires to the fuses, a number of which are placed in a single charge of explosive material. *k* is provided with a wooden head enclosed in an indented cylinder, closed by a cap; the head has a recess for the composition, and another for cement for the conducting wires. The Abel fuse, *h*, consists of a wooden head, into which the insulated conducting wires enter, and are covered with a tin foil cap containing the priming.

Powel's fuse, *l*, admits of being turned within the plug, which is screwed into the shell so as to bring corresponding apertures in the fuse and the plug into communication.

Fig. 4.



Fuses.

These are so adjusted to each other that the composition may be made to fire the bursting charge at the expiration of a given time.

**LOW WATER ALARMS**

may be classed under four heads, as follows:

1. The float movement: *A*. The float is attached to an arm, and is immersed in water in the chamber which communicates by pipes with the boiler. Should the end of the lower pipe be uncovered by the subsidence of the water to that level, the water leaves the chamber and the float falls, depressing the valve and admitting steam to the whistle. When the water rises again, the upper valve is moved to allow steam to depart, and the normal condition is re-established. *B*. The hollow steamtight case has a central hub and a sector space, occupied by the arm of a float, which rises and falls with the changes of level of the water in the boiler. An indicator on the same axis moves with the float. *C*. A float is placed on the crank arm of the valve stem, and rises and falls with the changes of the water level, bringing a stud on the stem against an inclined socket, and raising the valve from its seat. This allows steam to pass to the whistle.

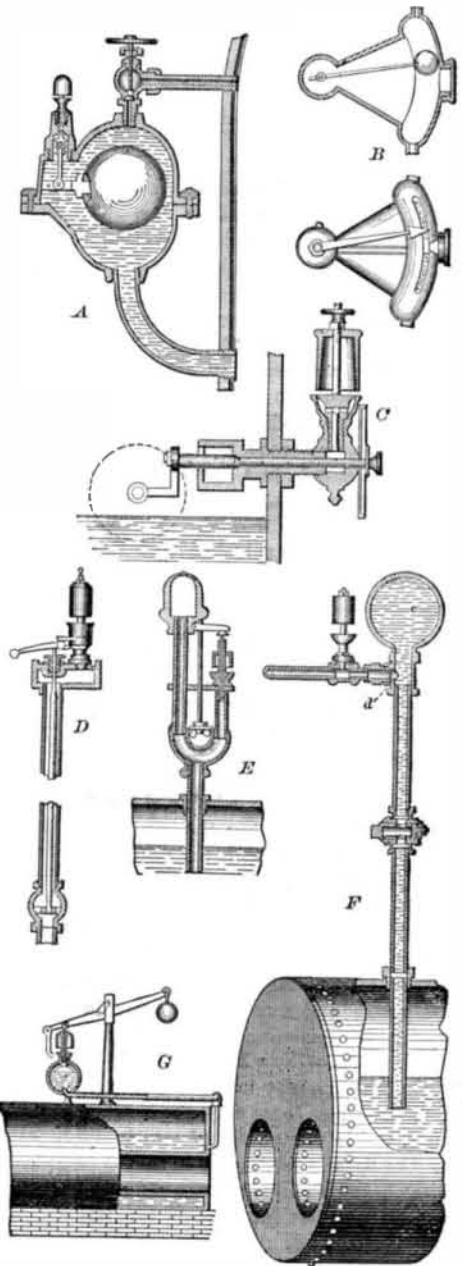
2. The thermostat movement: *D*. When the water subsides below the end of the vertical pipe, which extends downward into the boiler, the water contained therein is discharged and steam substituted. The increased heat, due to the presence of steam, elongates the thermostatic rod in the tube, and acts upon the lever to lift the valve from its seat; the steam rushes out and sounds the whistle. *E*. This acts similarly to the foregoing, except that the effect is due to the expansion of the steam pipes when the water is emptied and steam admitted. The lever has its fulcrum on a post between the pipes; the expansion of one of the latter depresses the valve stem and withdraws the valve from its seat; the expansion of the other pipe withdraws the seat from the valve. The action of the two is cumulative. The passage of steam sounds the whistle, as in other devices for the same purpose.

3. The fusible plug action. *F*. After the boiler has been filled to the water line and put in operation, the pressure of the steam forces the water into the pipe and air chamber, *e*. As there can be no circulation of water in the pipe as long as the lower end of it is under the water line, the disk, *d*, will continue solid; but when the water in the boiler evaporates below the end of the pipe to the alarm water line, then the water in it falls of its own weight into the boiler, and

steam at once takes its place, melts the plug, and notice of low water is given by the sounding of the whistle.

4. The gravity movement: *G*. A vertical pipe passes into the boiler, and its open end is at the level at which it is de-

Fig. 5.



Low-Water Alarms.

sired notice shall be given. This pipe forms a communication between the boiler and a reservoir on the end of a hollow arm and axis. In the normal condition this reservoir is filled with water; but when the end of the pipe is uncovered by the subsidence of the water level in the boiler, the water runs out of the reservoir and steam takes its place. The change of weight in the reservoir, due to the substitution of steam for water, causes the arm to be lifted by the weighted lever, and raise the valve which admits steam to the whistle.

**DECISIONS OF THE COURTS.**

**United States Circuit Court—District of Massachusetts.**

**BOILER PLASTERING.—THE UNITED STATES AND FOREIGN SALAMANDER FELTING COMPANY vs. THE MERRIMACK MANUFACTURING COMPANY.—THE SAME vs. THE LAWRENCE MANUFACTURING COMPANY.**

[In equity.—Before SHEPLEY, J.—Decided October, 1875.]

The first claim of plaintiffs is for a composition for coating the exterior of steam boilers, pipes, or other heated surfaces, composed of asbestos and lime putty, charcoal, and pumice-stone, or their equivalents, and is infringed upon by the defendants in their use of an inner coating of a mixture of clay and asbestos, crushed or ground, with the addition of a little hair and some other fibrous substance, with a coating composed of a mixture of clay and charred fiber, or coccoanut or cane sawdust ground, wool, or shoddy.

The second claim is for a composition, for the same purpose, of asbestos and lime putty. This claim is infringed by defendants in their use of asbestos and whitewash (which is the same as lime putty in this composition) and clay, which is also proved in this composition of matter to be a well known equivalent for the lime putty.

These are actions at law against the defendants for alleged infringements of letters patent No. 4,134, dated September 27, 1870, reissued to the complainants as assignees of John Riley and Charles W. Bissell for an improvement in compositions for covering steam boilers, steam pipes, etc., and also for alleged infringement of letters patent No. 114,711, dated May 9, 1871, and letters patent No. 108,055, dated October 4, 1870, both to John Riley, of Troy, N. Y., assignor to the complainants, for an improvement in compositions for covering steam boilers, etc.

The reissue No. 4,134 described the essential part of the invention as consisting in the employment of lime putty, or lime mixed with water, so as to be of the consistency of glazier's putty, with some non-conducting fibrous material, such as paper pulp, and with pulverized earthy materials, which are light, porous, and are non-conductors of heat, such as plaster of Paris, water lime, cement, sand, soapstone, or black lead.

The invention described in letters patent No. 114,711 consisted in the employment of a combination of asbestos and lime putty, either with or without the other ingredients hereinafter named, as a coating for steam boilers and pipes. The other ingredients named were charcoal and pumice-stone, or their equivalents.

The invention described in letters patent No. 108,055 consisted, so far as the invention related to the covering of steam boilers, in the addition of ground gypsum, or plaster, or pumice-stone to the composition described in the reissued patent No. 4,134.

The defendants coat their pipes with an inner coating of a mixture of clay and asbestos, crushed or ground, with the addition of a little hair and some other fibrous substance. The next coat is a mixture of clay and charred fiber of coccoanut or cane sawdust ground, wool, or shoddy. Outside of this is a thin wash of lime with a slight mixture of hair. Outside of the second coat, in some instances, is a mass of fiber wound around the second coating. This covering of cord or fiber is covered with lime.

This coating is an infringement of the first and second claims of letters patent No. 114,711, the first claim being for a composition for coating the exterior of steam boilers, pipes, or other heated surfaces, composed of asbestos and lime putty, charcoal, and pumice-stone, or their equivalents, and the second claim for a composition for the same purposes composed of asbestos and lime putty.

Defendants use the asbestos and whitewash, which is the same as lime putty in this composition, and clay, which is also proved in this composition of matter to be a well known equivalent for the lime putty. They also use the combination of asbestos, lime putty, and charcoal.

A large number of American and English patents are introduced in evidence as tending to show want of novelty. A careful examination of all these patents fails to afford any satisfactory proof that the patent No. 114,711 is void for want of novelty. The nearest approach to the composition of matter patented to the plaintiffs is to be found in the findings or sheets of asbestos and lime, which were not plastic like the compositions of matter in the Riley patents, but were wrapped or fastened around the pipes

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