

**IMPROVED APPARATUS FOR THE COMBUSTION OF SMOKE IN STEAM BOILER FURNACES.**

It is well known that in most furnaces of steam boilers a large part of the fuel escapes in the form of sparks, particles of carbon, carbonic oxyd, &c., without being consumed, in consequence of an insufficient supply of oxygen to the furnace; and many plans have been tried for furnishing the additional supply of air requisite for perfect combustion. We here illustrate a device for blowing currents of air into the furnace of a steam boiler, by the curious principle that is called the principle of Venturi. This principle is illustrated very clearly in Fig. 4 of the annexed cuts. Into the pipe, *a*, filled with steam under pressure, is inserted the small tube, *b*, so that steam may issue from its end in the direction indicated by the arrows. Now, if this jet of steam is allowed to flow through a conical tube, open to the air, a current of air will be carried along by the stream of steam with itself.

D. H. Williams, of Pittsburg, Pa., has invented an apparatus by which this property of a jet of steam is made available for introducing a blast of air into the furnace of a steam boiler. This apparatus is represented in the annexed engravings. Like letters refer to like parts in all the figures.

*M* is the boiler; *I I* are the side walls inclosing the boiler, boiler furnace, &c.; *F* is the furnace, showing also the grate bars; *G* is the combustion chamber formed by the side walls, *I I*, the bridge wall *J*, and the heat-retaining wall, *h*; the heat-retaining and deflecting wall *h*, has a flue or opening, *e*, for the passage of the products of combustion; *a* is the steam pipe by which the steam is conveyed from the boiler, *M*, to the nozzles, *b b* (with one-twentieth inch holes), which are arranged external to, and concentric with the air openings, *C C*; *d d* are the passages through the walls, *I I*, to the air chamber, *k*, in the rear of the bridge wall, *J*, for the free passage of the air to the air openings, *C C*; *B* is the water space, *S* the steam space, and *f* a stopcock regulating the flow of steam through the pipe, *a*, and thus the blast of air into the combustion chamber of the furnace. After the steam is raised in the boiler, if the stopcock, *f*, is opened, jets of steam will issue from the several tubes or nozzles, *b b*, and rush into the combustion chamber, *G*, carrying with them in their passage through the conical openings, *C C*, currents of air, on the principle of Venturi, as has been explained.

It will be seen that the currents of air into the chamber being numerous, the air is distributed very thoroughly among the unburned portions of the fuel, completing the combustion in the most effectual manner. The owners of the patent say that experiments have shown a saving of 20 per cent of the fuel by the use of this apparatus, which is applicable to either stationary or locomotive engines.

The patent for this invention was issued on May 15, 1860, to David H. Williams and R. B. Fitts, assignees of the inventor, and further information in relation to

the same may be obtained by addressing R. B. Fitts, at No. 609 Sansom-street, Philadelphia.

**ARTIFICIAL LEATHER AND SHOES.**—At Amherst, Mass., artificial leather is made of a mixture of sawdust, chopped flax, tar and waste paper, mixed with gutta percha. This article is used for stiffenings in shoes, and, to some extent, for inner soles. It is certainly much superior to the stiffenings of coarse brown

been attained in this machine, as it shells rapidly and perfectly clean, whether the corn is wet or dry, and delivers the grain in a sound and unbroken condition.

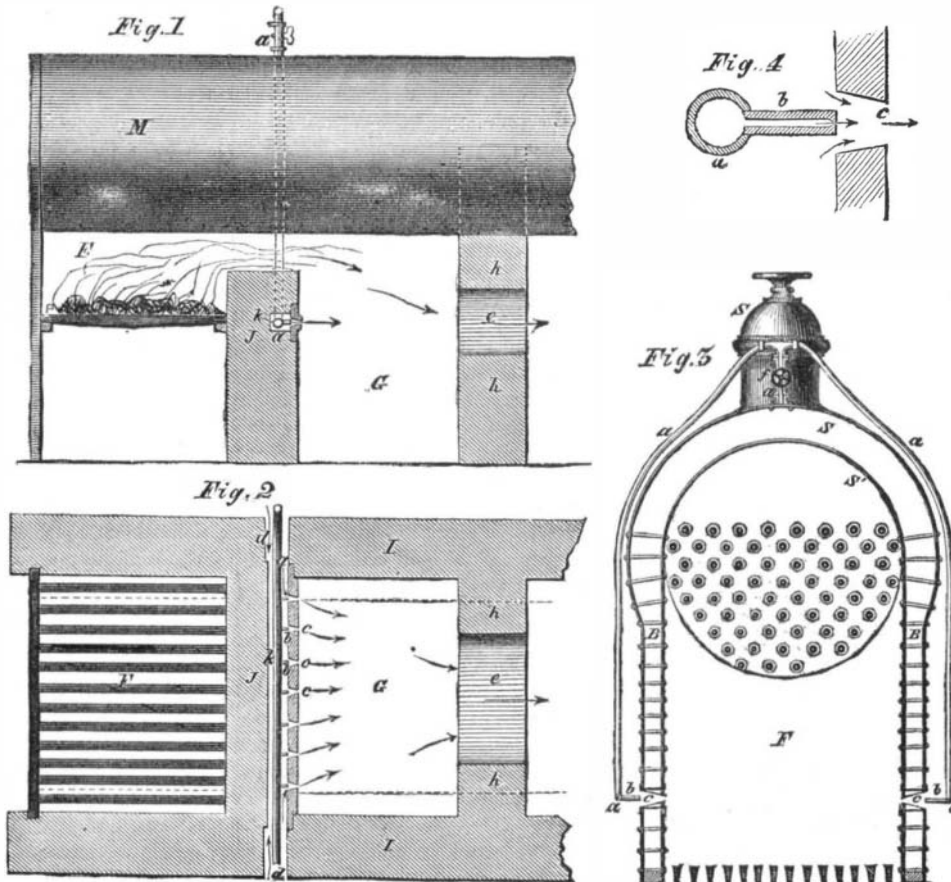
The corn is introduced through the hopper, *a*, to the cylinder, *B B*, which is constructed of rods of wrought iron (as shown by the dark lines), placed at such distances apart as to admit of the free egress of the shelled corn between them at any point. An iron cylinder, *c*, with broad flat teeth, rotates concentrically within the cylinder of rods, operated by pulley, *O*, and as the corn is fed in at *a* the cobs are forced out at the discharge end, *d*.

The rough surface presented within the rod cylinder, together with a slide in the discharge end, *d* (by which the cobs may be retained in the cylinder until thoroughly shelled), places the machine wholly within the control of the operator; and by the instant delivery of the grain the moment it is detached from the cob, all danger of its being cut or ground is effectually obviated, and the cylinder also kept free and clear from obstructions.

The cleaner attachment is also perfect in every part, consisting of a cylindrical screen, *e e*, surrounding the rod cylinder, and slowly rotating by means of the cog gears, *f* and *f'*, driven by pulleys, *g* and *g'*. The shelled corn is constantly agitated by the rotation of the screen, whilst a blast from the fan, *h*, driven by pulley, *P*, and gear wheels, *p* and *p'*, enters the screen at *m* and forces the chaff and dust out at *n*, with the cobs; thus effectually cleaning the corn, which falls through the screen to the floor. A sheet iron cap or jacket covers the screen. The entire machine is constructed of iron and firmly set within a frame, *e*, of like material, thus combining efficiency with durability in the greatest possible degree.

Every machine is warranted to perform as recommended, and all orders will be promptly supplied by the patentees and manufacturers, Hubble, McGrath & Richards, Lafayette, Ind.

**LIQUID GASES.**—MM. Drion and Loir have suggested a new method of obtaining gases in the liquid state, which consists in mastering the evaporation of certain liquids by the introduction of a minutely divided current of air. We have no description of the apparatus, so we can only give the results announced. The sudden evaporation of ether produces 34° C. of cold, which suffices for the liquefaction of sulphurous acid. The evaporation of liquid sulphurous acid produces 50° of cold, which liquefies ammoniacal gas. Liquid ammoniacal gas instantaneously vaporised gives 65° which will liquefy carbonic acid, and carbonic acid vaporised in the same way gives 87° of cold. By means of the cold produced by the evaporation of ether, the authors liquefied the carbonic acid obtained by heating bi-carbonate of soda in a sealed tube; and they proved that, when the action of the cold was discontinued, the acid re-combined with the soda. They also proved that, at very low temperatures, chemical combinations did not take place, for instance, at 67° sulphurous acid did not unite with ammonia.

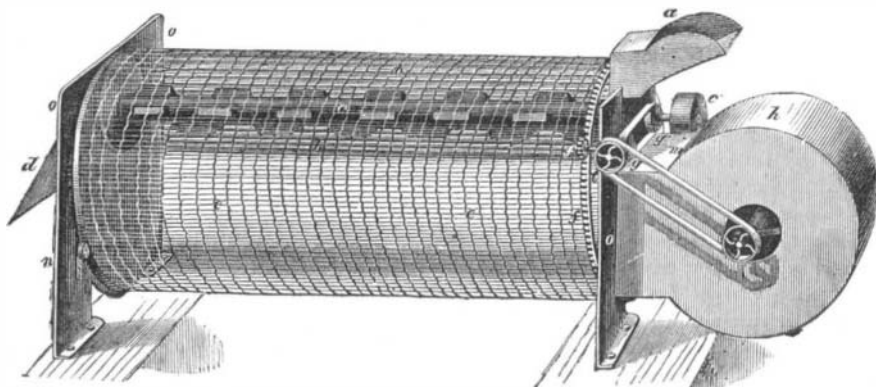


**WILLIAMS' IMPROVED SMOKE-BURNING APPARATUS.**

paper, which was formerly used in cheap Eastern shoes. A very good improvement has recently been produced in stiffening the heels of stout boots and shoes, in the form of thin plates of sheet zinc sewed in between the lining and the outer leather. Heels thus formed always remain stiff, and never break down.

**IMPROVED CORN SHELLER AND CLEANER.**

The annexed engraving represents a new power corn sheller and cleaner, for which Letters Patent were



**IMPROVED CORN SHELLER AND CLEANER.**

granted to Messrs. Hubble, McGrath and Richards, of Lafayette, Ind., on Sept. 5, 1860, and which, judging from the testimonials of parties now using them, is far superior to other shellers now in use. Messrs. Spears & Hardy, of Lafayette (one of the largest grain firms in the West), state that they have shelled 300 bushels per hour with one of these machines, now in their warehouse, and that they are confident they can shell 5,000 bushels per day. Many others speak practically of their superior advantages.

The great desideratum in corn shelling seems to have