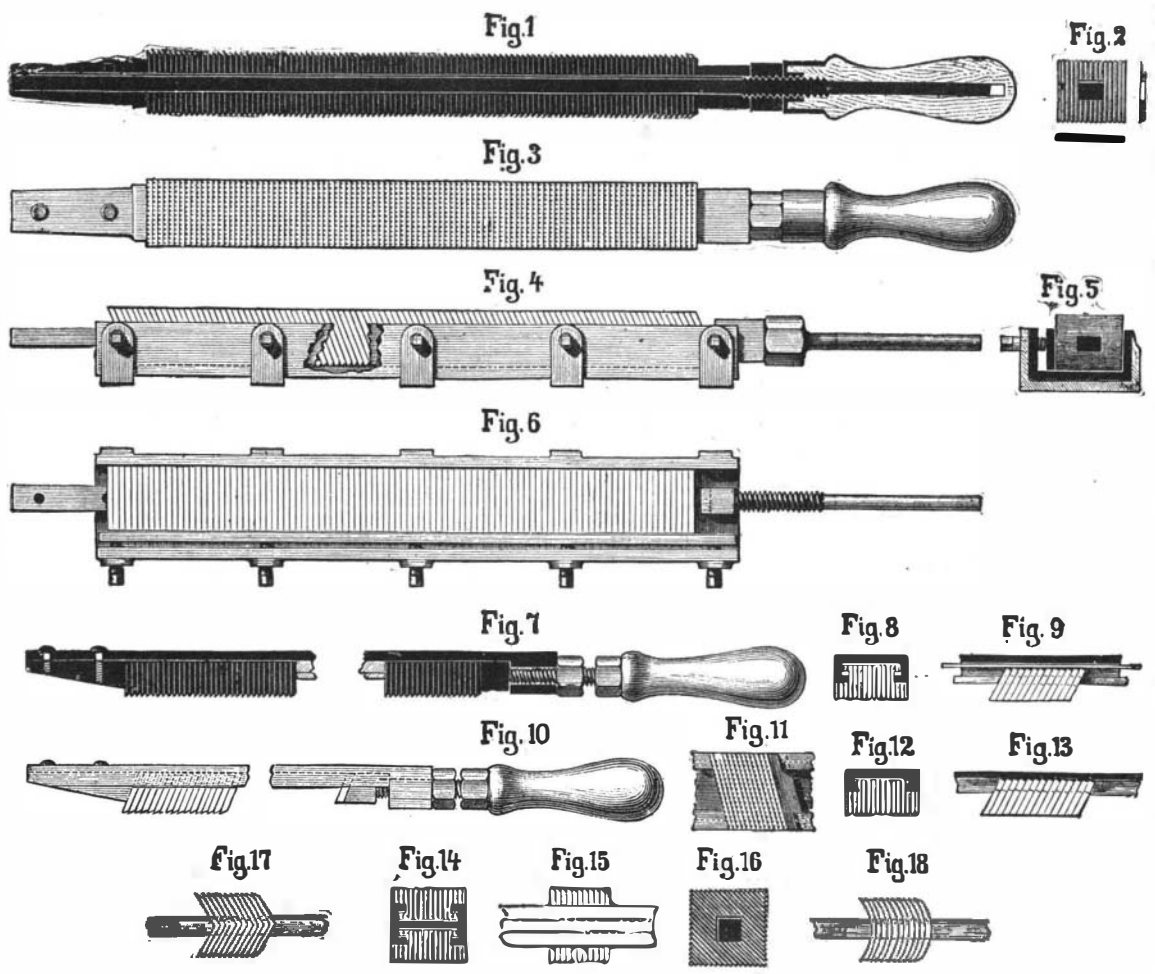
THE BUILT UP FILE.

This file is composed of a series of serrated plates, held together by a nut and screw, and which plates can be sharpened on a grindstone, recutting in the ordinary way being obviated. Fig. 1 of our engravings shows a longitudinal and Fig. 2 a transverse section of this file, with two sectional views of a plate. Fig. 3 shows the cutting surface of the file. The body of the file consists of a number of plates or leaves, which are grooved or serrated on one side, as in Fig. 2. These leaves have a square hole in the center, and are threaded on a square steel bar, alongside of which is inserted a thin band of steel for tightening purposes. At one end of the bar is a cap fixed by rivets, which prevents the leaves slipping off.

At the opposite or handle end is a steel ferrule, kept in place by a screw nut, beyond which is a handle working on an internal screw, the whole being screwed up tightly on the cap at the lower end. It will thus be seen that Figs. 1 to 3 represent the file in its working condition. When it gets blunt, it i sharpened in the following manner. The handle is first unscrewed and the nut loosened, then the cap at the lower end is taken off, and finally the thin steel band drawn out. This sufficiently loosens the leaves to allow them to decline at an angle of 22° to the center bar. In this position the surface to be ground presents a smooth face, as shown in Fig. 4, and thus the file can be sharpened on a common grindstone by any laborer without the trouble and cost of sending to a file cutter. The file is put into an iron box or form, as seen in Figs. 4, 5, and 6, and this box is fitted with an inside sliding bar, which can be screwed up tight to keep the leaves in position for grinding, as in Figs. 5 and 6.

Fig. 7 shows in longitudinal section a file having one cutting side only, and Fig. 8 the same file in cross section. Here the leaves are not placed on a bar, but inserted in a frame. The tightening up is effected by the same means as in Figs. 4, 5, and 6. To grind this file the handle and nut must be removed, the cap taken off, the leaves brought into an inclined position and fixed by a steel band, which is inserted between the frame and the upper edges of the leaves, as in Fig. 9. Figs 10 and 11 also represent a one-sided file, where the leaves are placed at an angle with the bottom and side of the frame. Figs. 12 and 13 show respectively a transverse and longitudinal section of this file. For grinding purposes, the leaves need only be turned so that the grooved sides are toward the handle, thus forming a smooth surface. Fig. 14 is a cross section of a file with a cutting face on both sides. The system of handling is the same as in Fig. 7. Fig. 15 is a side view of the same. Fig. 16 is a cross section of a file similarly constructed to Figs. 1, 2, and 3, but which can be used on all four sides by the diagonal serrations of leaves. There is, however, this disadvantage—the cutting surface decreases in width when the file is ground on all four sides, whereas the cutting surfaces of the two-faced files are not diminished in breadth. Figs. 17 and 18 are also similar in construction to Fig 1, except that the leaves are made angular or circular. The straight leaved file is, however, preferable not only for working effect, but also for greater facility and exactness in grinding. These files are used in the same way as an ordinary file, but they are said to require much less pressure.

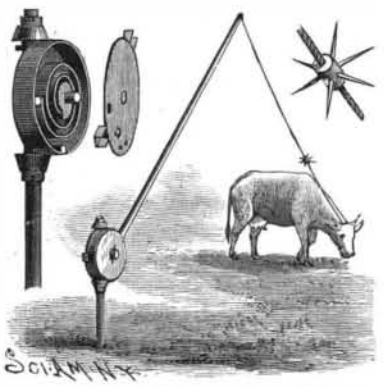
The advantages claimed are an increase of working power, durability, and the facility of resharpening by grinding, thus avoiding the necessary heating for recutting and rehardening. It is stated that it never gets clotted, and is more easily cleaned than the ordinary file. A manufacturer of this file at Vienna calculates, says *Iron*, that whereas the ordinary file has to be recut after ten days' use, the Muller file will stand 20 days' use without requiring resharpening, and that it can be resharpened twenty-one times, while the ordinary file can only be recut six times. Its working power would therefore be 420 days, against 60 days of the ordinary file, until its complete absorption. Thus the Muller file should perform the work of seven ordinary files, at the cost of only twenty-one grindings, as against forty-two recuttings of the ordinary file. Therefore the latter, although at first cheaper than the former, would in the end appear to be four times as expensive.



IMPROVED BUILT UP FILE.

IMPROVED TETHER.

Driven into the ground a sufficient distance to hold it firmly in a vertical position is an iron stake, upon the upper part of which a casing is held. The casing is free to turn upon the stake, and in its edge are formed suitable sockets for the reception of one end of a light wooden pole, which is pressed toward a vertical position by a spiral spring arranged within the casing as shown in the left of the engraving. To the outer end of the pole is secured the tethering rope, provided at its outer end with a snap hook. It will be seen that as the animal grazes around the stake, it will turn the spring casing and the pole to which the rope is fastened, thus preventing the rope from being wound around the pole



The pole can be drawn over to one side to a certain extent, and will be brought back to a vertical position when the downward strain is taken off. Upon the outer part of the rope is a spur ball, which may be adjusted in any desired position on the rope. This spur ball, by pricking the animal in the side or shoulder, prevents it from pulling straight out on the rope. This tether is simple, strong, and efficient, and can be readily taken apart when moving from place to place, and can be as readily set up in working portion.

This invention has been patented by Mr W. B. Farrar. Further particulars can be had by addressing Mr. C. D. Benbow, of Greensborough, N. C.

Accidents with Odorless Fuel Gas.

From the time that coal gas was introduced, its disagreeable odor has been the subject of criticism. This comment was met by its advocates with the assertion that its odor, as disclosing any escape or leakage, was a good feature. Their claim has received, during the last few weeks, a most melancholy confirmation.

Fuel gas, essentially a nearly odorless mixture of carbon monoxide, hydrogen, and one or two other gases, has recently been introduced into the city of Troy, N. Y. It is distributed through pipes purchased of a steam heating company, whose works as well were purchased and utilized by the fuel gas company. Toward the end of the past year, several operatives in a laundry were overcome by some unknown cause. They suffered from headaches and other symptoms, and soon fainted away. It was found that fuel gas had been escaping into the room, and this at once gave the cause of their sickness. More recently another similar case occurred. In both these instances, the blame was attachable to the consumers, who had left faucets partly open

On the fifth of January of this year, a number of people were similarly affected, twelve in all succumbing to its influence in different buildings, but situated on the same block, about 300 yards from the gas works. A leak in the gas main had permitted the gas to escape, and it found its way, possibly by the sewers, and thence through the sewer pipes, to the houses affected. The victims, after suffering considerably, gradually recovered. The doctor, on reaching the scene, was informed that no fuel gas was used in any of the buildings, but notwithstanding this, suspecting the cause of the trouble, opened the windows and used th remedy of plenty of ventilation. Owing to this timely action, due to the belief of the attending physician that gas was at the bottom of the trouble, the result was far less disastrous than it would otherwise have been.

But a further escape of the gas occurred on Sunday, January 16, within a hundred feet of the works, which, in addition to producing injurious effects upon people, killed outright two victims—a man, Charles Pratt, and a woman, Mrs. Caroline Bennett. In consequence of this, a special meeting of the Troy Council appointed a committee to investigate the condition of affairs with the gas company. Pending the investigation, the franchise of the company was suspended by a unanimous vote. The company is said to have expended over $100,000 on their plant, and had a large new holder nearly ready for operation. It is doubtful if they will resume operations on the old plan.

The point proved is that an odorless gas is unfit for general distribution. The company had hoped to succeed in imparting an odor to their product, so as to make it safe in the sense that ordinary illuminating gas is. Absolutely no odor could be detected in the buildings charged with the fuel gas, although those prostrated by it in some instances spoke of tasting it. It was emphatically a hidden foe. The writer, as a gas engineer, has had considerable experience with coal gas, having been overcome with it a number of times. This can never happen without forewarning by its characteristic odor. Coal gas, moreover, contains so little carbon monoxide that its effects are not nearly so serious as those of water gas such as that made by the Troy Company On resuscitation from the swoon produced by coal gas, large quantities of milk can be imbibed with benefit, the system seeming to crave this nutriment.

The gas companies who wish to sell fuel gas have before them the task of discovering some available compound that can be used to impart a characteristic odor to their product. If it were not for its high cost, a little nitro-benzole, the artificial oil of bitter almonds, might answer a good purpose. A gas at once odorless and poisonous is a dangerous subject to handle. In all the history of science, it is hard to find a more heroic devotion than that displayed by Sir Humphry Davy, who, in his studies of gases, inhaled a number of them, to determine their effects upon the system. It was thus that he discovered the peculiar properperties of laughing gas. The world is to be congratulated that he did not inhale carbon monoxide in fatal quantity. The Troy fuel gas was made by the Lowe process. Its want of odor having come to be recognized as an evil attribute, experiments had been conducted with a view to curing this defect. Carbolic acid was tried and found too expensive, and the addition of a sufficient quantity of hydrocarbons would remove it from the category of a non-luminous fuel gas. It had been sold for fifty cents a thousand; and while public sentiment was strongly roused against it by the fatal occurrence of January 16th, the laundry proprietors feel that the probable definite deprivation of it is a serious loss and inconvenience to them.

Cornell in Luck.

It is rumored that Mr. Hiram Sibley, the founder of Sibley College of Mechanic Arts, Cornell University, is about to add to his previous liberal donations to that institution $250,000 Since Professor R. H. Thurston has become the director, and had charge of this college, its success and influence has been greatly augmented.

EIGHT thousand miles of new railroad were built in the United States during 1886.