side of the pillar, fixed to the base of the pedestal, which itself remains stationary. The chain from these cylinders passes round a drum at the foot of the pillar. All the motions are controlled with the greatest ease by one man in a valve house on the side of the pedestal. There are two of these houses on opposite sides of the machine, so that he can use whichever is most convenient for enabling him to see into the vessel. The pressure water is conveyed to the crane by movable and jointed pipes, which can be attached to hydrants placed at convenient distances on the hydraulic mains along the quay wall. There is an auxiliary or anti-breakage crane on the side next the dock, the foot of the jib being carried from the pedestal and the top by means of a chain from the top of the pillar, the invention of Mr. Charles Hunter, engineer to the Bute trustees. By an arrangement of a hopper resting on the deck, with telescopic throat, which is closed by a conical bottom or valve held up by the auxiliary crane, the first few wagonfuls of coal can be lowered quietly to the bottom of the hold, and a conical heap formed for the following coal to fall on, as is done at the hoists, so as to lessen the breakage of coal. When the anti-breakage crane is not in use it can be swung to one side, clear out of the way. It is found in actual work that a wagon can be shipped in from two and a half to three minutes. The crane was designed and constructed by Sir William G. Armstrong, Mitchell & Company, and is similar to their well known and largely adopted movable hydraulic cranes for cargo and ballast work. These cranes were first introduced at the suggestion of the writer about fourteen years ago at the Atlantic Wharf of the Bute East Dock, to supersede fixed cranes. The introduction of the movable crane resulted in such an increased amount of work and dispatch to steamers that all the dock companies very soon recognized the importance of adopting cranes of this type. At the Royal Albert Dock, London, there are about ninety of these cranes. The number of tips for shipping coal at the Bute docks is now as follows: Thirteen balance tips at the west dock; twelve balance tips at the east dock; eight hydraulic tips at the east dock and entrance basin, shown at H H; one hydraulic tip in the entrance channel for loading in the tideway; eight hydraulic tips at the Roath basin; forty-two total number of tips. One movable hydraulic crane capable of lifting twenty-five tons. Each tip is capable of shipping 1,000 tons of coal per working day; the total shipping capacity of the Bute docks is therefore equal to nearly 12,000,000 tons of coal per annum. In some instances as much as 200 tons of coal have been shipped per hour at the hydraulic tips; and it is now not uncommon for a steam collier of 2,000 tons burden to enter the basin at high water of one day, discharge her ballast, receive her outward cargo, and leave at high water the following day, the entire operation having occupied less than twenty-four hours. The principal portion of the trade carried on in the Bute docks is the export of coal and iron, which amounted to 2,750,000 tons in the year 1873, and to 6,916,000 tons in 1883. The import trade of iron ore, timber, and general merchandise amounted to 630,000 tons in 1873, and in 1883 to 1,299,000 tons.—*The Engineer.*

Two Good Remedies for Sprains.

From the same cause which renders necessary such contrivances as the nose straightening mask, illustrated in last week's issue of this paper, broken legs, sprained ankles, and wrenched wrists are produced. The following new remedies for sprains are said to have proved very efficacious. Dr. Thos. L. Shearer recommends and practices the use of clay, such as is used for making bricks, free from gravel, dried, and finely powdered in a mortar. This powdered clay is mixed with water into a thick and moist consistence. This is then spread on muslin to the depth of a quarter of an inch, and applied entirely around the part. Over this is placed a rubber roller bandage, just lightly enough to keep the dressing from shifting, and retain the moisture. This application should be renewed every twenty-four hours. It appears, by this method of treatment, the most severe sprains are cured much more rapidly and satisfactorily than by the old system.

The same authority states that powdered dried earth sprinkled on the surface of an ulcer, and kept in position by adhesive straps, is a capital dressing for cases which are so weak that even the weakest ointment tends to break down the granulations.

Professor Brinton, another celebrated practitioner, says that the best thing for a sprain is to put the limb into a vessel of very hot water immediately, then add boiling water as it can be borne. Keep the part immersed for twenty minutes, or until the pain subsides; then apply a tight bandage, and order rest. Sometimes the joint can be used in twelve hours. If necessary, use a silicate of sodium dressing.

No Cats.

There is not a single cat within the limits of the town of Leadville, Colorado. Cats have been imported there by the hundreds, and in all varieties of color and size, but not one has ever survived the second week of residence. However, as there are no rats and mice in Leadville, there is no real need of cats, and it makes little difference whether they live or die. The thin atmosphere at that altitude (10,200) is as fatal to the vermin as to their foe, and the inhabitants are thus mercifully spared the inflictions of both.—*Chicago Inter-Ocean.*

AN IMPROVED GUN SIGHT.

The form of this sight, and the optical principle involved in its construction, will be readily understood from Fig. 1, which shows it in perspective and in vertical section. When aiming, the sight has the appearance of a ring or hoop, which shows the front sight and the object aimed at

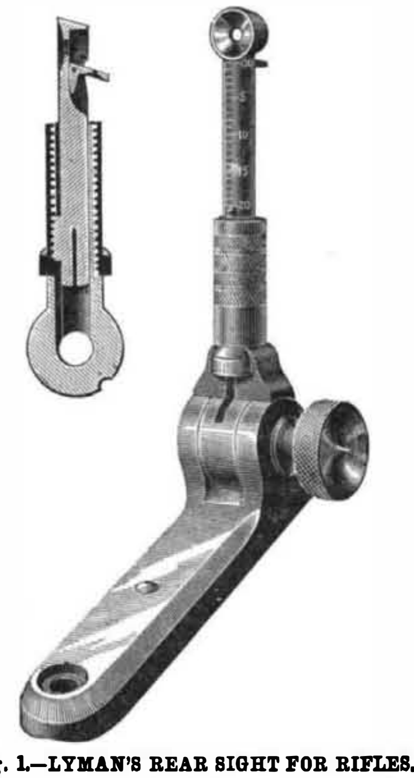

Fig. 1.—LYMAN'S REAR SIGHT FOR RIFLES.

without intercepting any part of the view. Fig. 2 gives an approximate idea of how the sight appears when aiming, and Fig. 3 shows how the common open sight appears. In the first it will be noticed that the top of the rifle barrel and the front sight are seen as distinctly as if no rear sight was used; while in the second the most important part of

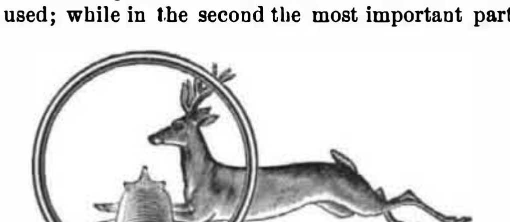

Fig. 2.—APPEARANCE OF SIGHT WHEN AIMING.

the view is shut out, and there is great difficulty in quickly getting the front sight in the notch of the rear sight. The aperture in this sight, being very near the eyes, is greatly magnified as compared with the notch in the common sight; and although this may cause the impression that an aperture which looks so large cannot allow of accurate

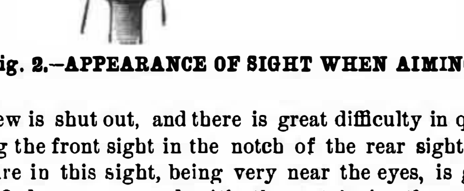

Fig. 3.—APPEARANCE OF COMMON OPEN SIGHT WHEN AIMING.

aiming, it is true that the larger this small aperture looks, the more accurate the aim. The accuracy is also increased, as the distance from this sight to the front sight is nearly twice as great as from the ordinary open sight to the front sight. The rim of the sight can be instantly changed, to give it a large aperture with a narrow rim or a small aper-

Fig. 4.—SIGHT ATTACHED TO IMPROVED BASE.

ture with a wider rim. The sight can be easily placed upon any rifle. Fig. 4 shows a sight attached to an improved base, lately patented, which not only looks better on the gun than any other rear sight base, but it allows of greater elevation for shooting.

The inventor, Mr. William Lyman, of Middlefield, Conn., to whom inquiries should be addressed, has received many highly commendatory letters from those who have repeatedly tested the efficiency of this sight. Dr. J. W. Wright, president of the New York Rifle Club, states that his experience with it has "involved almost every variety of shooting at the shorter ranges, *i. e.*, up to 500 yards, and it has been used for large and small game, in dark woods and in bright sunlight, across water and overland, and I am convinced that, for quick work, it is unequaled. It gives the hunter all the advantages of an abundance of light, together with a complete view of the surroundings of the object to be hit."

Some Useful Notes for Engineers.

Among the questions most frequently asked of our inspectors when making their ordinary visits, says the *Locomotive*, are the following, which are of such general interest to engineers as to warrant publication:

1st. How much water per pound of coal should be made into steam at 60 pounds pressure per square inch with 60 inch tubular boilers properly made, well set, and carefully fired?

Under the above conditions, from 8 to 10 pounds, depend-ent somewhat, of course, upon the quality of the coal and the temperature of the feed water.

2d. How much more coal per pound of water does it take to carry 80 pounds per square inch than it does to carry 60 pounds per square inch?

This question could with more propriety be put as follows: How much more heat does it take to make a pound of steam at 80 pounds pressure per square inch than it does to make a pound at 60 pounds per square inch?

Practically, no more coal will be required; theoretically, about 0·4 of one per cent, or about 1-250 part more.

3d. Do you get enough better results from steam of 80 pounds per square inch than you do from steam 60 pounds per square inch to pay the extra wear and tear of boiler and engine?

Depends entirely upon conditions. If you can make use of steam of 80 pounds pressure, it pays to use it; there are conditions, however, where 60 pounds, or even less, would be decidedly more economical.

4th. How much more heat do you get from pipes carrying 60 pounds pressure than from pipes carrying 10 pounds pressure?

Two and one-tenth per cent more heat will be given out per pound condensed from steam of 60 pounds pressure than from steam of 10 pounds pressure, in falling from temperature due to the respective pressures to 212° Fahr.

5th. What proportion of direct heating surface to the volume of a fairly protected room is required to maintain the temperature of the room at 60° Fahr. in buildings heated by steam?

From 1-75 to 1-250, according to size and exposure of room.

6. How much is a given amount of steam reduced in bulk by compressing it from 60 pounds per square inch to 80 pounds per square inch?

About 20 per cent. See any steam table.

Working Hard Iron.

In a little jobbing machine shop the proprietor and sole workman was sweating and swearing over the obduracy of a lot of very thin castings which he was trying to drill for riveting, and to file for fitting. Some of the castings were very hard, and ground out and broke drills at a fearful rate. Where the grindstone or the emery wheel could reach, they were used instead of the file. Many of the pieces were rejected because of their hardness, and it was thought necessary to make them of iron to be made malleable at a greatly enhanced cost.

A visitor suggested the use of spirits of turpentine on drill and file. After some demur it was tried, and the work proceeded. The speed of the drill was somewhat reduced from that of a drill in soft gray iron, but the obdurate material yielded to the persuasive influence of the turpentine. The file was kept wet with it, and there was no difficulty in cutting the hard metal. It is ascertained, however, that the supply of turpentine must be continuous—a common mucilage brush is handy for the purpose—and that the turpentine, evaporated and oxidized by exposure until it is somewhat viscid, is better than the limpid spirit, as having more body.

Bursting of a Fly Wheel.

In Boston, Mass., on October 18, an iron fly wheel weighing 125 pounds, and attached to a wood sawing machine in a coal and wood yard, burst into many pieces, which flew in all directions, smashing wagons and other objects, but killing no one. One piece, weighing about 50 pounds, took a singular journey. It was propelled straight into the air, and descended in the front entry, just inside the door, of a wooden dwelling house, a distance of 400 or 500 yards. The piece crushed through the flat roof of the dwelling, which is a two and one-half story structure, carrying away plastering and laths. It then went through a feather bed in the room, and taking an oblique course went through the wall about six inches from the floor, dragging with it a portion of the mattress. The flying missile struck the bed at its head, and just where a person's head would naturally lie if the bed was occupied. Pursuing its course, the iron fragment still descended with frightful velocity, carried away a portion of a flight of stairs, and went through another wall, where its further progress was stopped.