

**PNEUMATIC APPLIANCES FOR MINES.**

A fruitful source of danger and a constant bill of expense, even under the most favorable circumstances, are involved in the style of hoisting apparatus in common use in our mines; and that these conditions are greatly aggravated by frequent fires and other accidents, is the painful experience of all miners.

As whatever promises to remove or abate these evils possesses general interest, we give a brief description, condensed from the *Revue Universelle*, of the pneumatic system of hoisting in mines, in successful operation at the mines of the Epinac Mining Company, in France, a system combining so many eminent advantages that it must ere long be generally adopted here.

The idea of applying compressed or rarefied air for hoisting the cars from a mine, in a closed tube, by means of a piston, is old. For depths of 1,200 to 1,600 feet cables and hoisting machines suffice for a large output, though they are open to the objections stated above; but as the mines become deeper the difficulty increases, the dimensions which must be given to the machines and the ropes become enormous, and the number of trips made by every cage, in twenty-four hours, decreases rapidly.

The velocity which must be given to a piston in a tube is by far greater than any speed which can possibly be acquired by rope without peril.

The main point, however, is that in the pneumatic system the dead weight remains constant, whatever may be the depth reached. If two connected tubes are used instead of a single one, the dead weight is entirely done away with, as the pistons and cages balance one another, supported as they are by a column of air weighing almost nothing, instead of being suspended from a rope which is heavy and cumbersome, and is exposed to a break at any moment. The elasticity of atmospheric propulsion seems a guarantee against any accident.

There is a deficiency in the motive power of the Epinac plant, as the machine can only exhaust 36 cubic feet a minute, but a more powerful one is now building which will do at least ten times as much, and reduce to two minutes the time required for the ascension of a car from the depth of 2,000 feet.

As it is working now, the system has furnished an output three times greater than that which the same motor, working with ropes in the ordinary manner, could yield.

Hoisting by means of a pneumatic tube calls for a plant composed of three principal parts: the machine for exhausting the air above the piston, the pipe passing through the whole shaft, and the piston which carries the cars. At

the Hottinguer shaft, near Epinac, the tube is composed of 674 rings of sheet iron and 18 special cast iron rings which are destined to receive the accessory apparatus. The diameter of the tube is 5¼ feet, one ordinary ring weighing about 11,000 lbs. Each one is made of one sheet, the edges being riveted together, with the inside heads countersunk.

The horizontal joints are made of angle iron, 2½ inches wide and 0.56 inch thick, with countersunk rivets. This angle iron, therefore, forms flanges, which are connected by 60 bolts. Rubber rings are placed between the joints to make the tube air-tight and to permit some play for variations of temperature. The door rings are 0.56 inch thick, and are furnished at opposite sides with doors which allow the cars to go in or out. They have a vertical sliding motion. The valve rings are very similar to the sliding sluice valves of gas mains. The tube is braced against the timber of the shaft, and is furnished with various accessory attachments, such as brackets, cocks, valves, working and equilibrium pipes, barometers, and safety valves. The safety valve pipe starts from the bottom of the tube and leads to the open air, where a valve is attached which may be closed at will; with its aid the speed of the piston in rising or descending may be regulated.

The upper piston carries the cage which holds the car; below the cage there is another piston which is called the lower piston. The upper piston is double, the two parts which compose it being so far apart from one another that the distance exceeds the height of the doors. The lower piston has a valve which is opened when the car carries passengers.

At the charging and discharging stations the full cars are placed or taken off in three movements, which are effected in the most simple manner by opening or closing the admission or escape valves of the air.

This system has been working at the Hottinguer pit for eighteen months without any injury to the tube or the cages, and without any repairs. Besides a saving in fuel this system possesses the advantage of leaving the shaft open for inspection, repair, etc. The disadvantages connected with ropes, the danger of their uses, and the expense of their frequent renewal disappear entirely.

The ventilation of the mine is also increased, and the hoist-

ing apparatus may be made a valuable adjunct of the ventilators when a strong barometric depression makes the danger of fire-damp greater than usual.

We would add that if this system were applied generally to warehouses and hotels we should happily have to record fewer destructive fires and fewer accidents to life and limb for which the present style of elevator is responsible.

**The Transplantation of Tissues.**

A series of systematic experiments on the transplantation of tissues has, says the *Lancet*, recently been carried out by Dr. Zahn. The first observations were made on the transfer of hyaline cartilage from one adult animal to another. The tissues into which the fragments were implanted were the subcutaneous connective tissue, the anterior chamber of the eye, the submaxillary glands, the kidneys, the testicles, and the blood vessels. These attempts yielded, however, negative results; the cells of the tissue perished, the intercellular tissue persisted, but the fragment became encapsuled by connective tissue. The experiments were much more successful when the fragment was taken from foetal cartilage, which showed a remarkable capability of developing in another organism, even in that of an adult animal. If some cartilage were rubbed up with amniotic fluid, the smallest quantity of the mixture produced, in about six weeks, nodules of cartilage the size of a lentil seed. On injecting this mixture into the jugular vein, numerous growths of cartilage were subsequently found in the lungs.

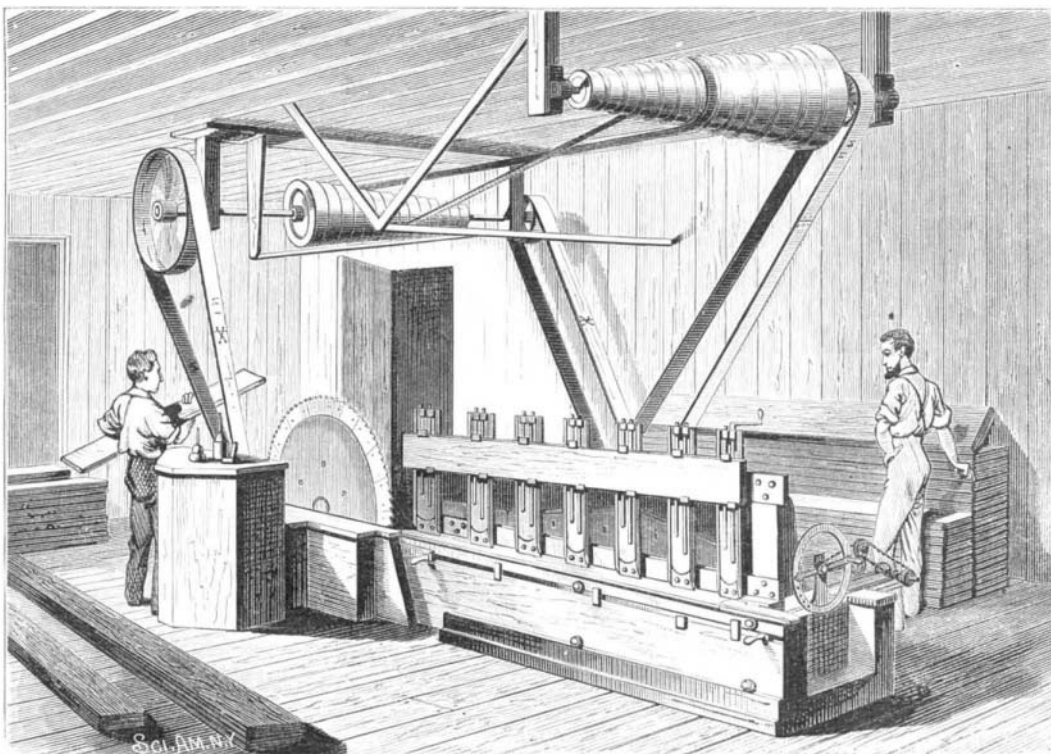


Fig. 6.—THE CHICKERING PIANOFORTE MANUFACTORY.—THE VENEER SAWING ROOM.

The capacity of foetal cartilage to develop is so great that these results were obtained not only with animals of the same species, but even with those of different species. For instance, cartilage from the foetus of the cat gave rise to nodules in rabbits. Experiments were also made with the cartilage from an enchondroma, with less uniform success than with foetal cartilage, but with much more success than with ordinary adult cartilage. In several instances the attempts to transplant it were successful. This is, it is hardly necessary to point out, a result of much interest in connection with the diffusion of enchondromatous growths. With other foetal tissues Zahn was also successful. A piece of growing bone, for instance, became connected with the bloodvessels of the tissue into which it was placed and became nourished. Entire bones were even thus implanted, and, although they did not grow as a whole, they preserved their form, and outgrowths occurred—exostoses and enchondromata—at both the epiphyses and diaphyses. From these experiments, and those of previous investigators, Zahn concludes that only foetal tissues, and such adult tissues as preserve their foetal peculiarities, can develop in another animal, or in another part of the same animal. Only, for instance, the red marrow will do so, and the periosteum of young individuals. Such tissues alone possess the capability of persisting until they have come into relation with the new organism.

**Gas Light.**

At the British Association the report on the best means of developing light from coal gas, by Dr. Wallace, of Glasgow, was read by Dr. Wills, F.R.S. He approved the use of cannel rather than common gas on account of its comparatively small influence on the atmosphere of apartments, and the smaller proportion of sulphur it contains. He also recommended that gas be formed at low pressure, and that district governors be used to ascertain the pressure at different levels in towns. He mentioned the fact that the average illuminating power of gas delivered by the Scotch companies was 26 candles, whereas in London it is only 16, and in the chief cities and towns of England and Ireland only 14. The use of globes round light reduced the quantity 10 per cent.

**The Absorption and Excretion of Water.**

The absorption of water from the alimentary tract is a subject to which less attention has been directed than its practical importance deserves, for the subject is not so simple as might at first sight appear. Dr. Skorczewski, of Cracow, has, says the *Lancet*, made an interesting series of observations on the relation in time and quantity between the absorption of water and the excretion of urine, and his results have been published in a Warsaw journal. The observations were made upon men and rabbits, and in the latter provision was made to secure the urine as soon as it passed into the bladder. Spring water, soda water, and certain Russian mineral waters (those of Krynicza and Iwonicz) were employed in the observations. The following conclusions were reached. After the injection of spring water the quantity of urine did not increase immediately, in the case of either men or rabbits, but rose after a certain time, which is said to have been the longer the more water was taken. A longer period elapsed after the spring water than after the mineral water before the increase in the urinary secretion occurred; and the more spring water was taken the longer was this interval, and the more mineral water the shorter was the interval. The increase in the urinary secretion reached its height sooner after the mineral water than after spring water. The greatest total effect on the urinary secretion was obtained by soda water, the next with spring water, and the least with the mineral waters. The quantity of urine was in each case smaller than the quantity of water

ingested, with the exception of that which was saturated with carbonic acid. The difference between the total quantity of liquid taken and the total quantity of urine excreted was less after ordinary spring water than after the mineral water.

A second series of observations had for their object to ascertain the relation in time and quantity between the water absorbed and the urine excreted. This was effected by killing rabbits at certain periods after the water was injected into the stomach, the excretion of urine being observed in the same way as before. From these observations it appeared that the increase in the excretion of urine did not commence until after the whole of the water had been absorbed, and in the case of both small and moderate quantities of water (40 to 100 c.cm.) a period of ten or fifteen minutes passed after all the water had been absorbed before the effect on the urine was apparent. It is calculated that 500 cubic centimeters of water is absorbed from the human stomach in fifteen minutes, and 200 c.cm. in five minutes. These results are true, however, only of spring water. Mineral water behaves differently. The increase in the excretion of

urine occurs the earlier the slower the absorption progresses. By the exclusion of certain possible causes for this difference, such as altered pressure in the abdominal cavity, direct irritation of the splanchnic nerve, or the effect of blood tension, the conclusion is reached that the cause is the alteration in the blood consequent on the admixture with it of the saline substances in the mineral waters, the change in the blood acting as a stimulant to the vaso-motor nerves.

Whatever be the precise value of these researches, they show conclusively that the function of the stomach and kidneys may be materially affected by the presence of very small quantities of saline substances, and they indicate how much caution is necessary in applying rules true of pure water to water which we are accustomed to consider as differing from spring water by very trifling qualities. As an instance of the practical importance of these facts, it is evident that the saline waters, so commonly taken with food, remain in the alimentary canal for a much longer time than spring water, and are capable therefore of disturbing in a greater degree the process of digestion.

**U. S. Surveys of South American Rivers.**

The U. S. steam sloop-of-war *Enterprise*, after an absence of five months, surveying the Amazon and Madeira rivers, in South America, returned to the Brooklyn Navy Yard September 26. Her commander, Thomas O. Selfridge, was in command of the Darien Survey Expedition in 1871-2. He reports having had a successful expedition. They took a complete range of soundings at five minute intervals throughout the day, which, together with frequent observations, will insure correctness of the charts. The survey extended from the mouth of the Amazon and up the Madeira to the falls. For a distance of 500 miles up the Madeira river the water was navigable for vessels of 20 feet draught. Near the mouth of the Madeira the Amazon was about a mile wide and 60 feet deep.

**Compressed Tea and Coffee.**

Tea and also ground coffee are now compressed into cakes by hydraulic presses. The method, it is said, makes them more readily transportable and unalterable for a length of

time. The coffee is subjected to a pressure of from 40 to 70 atmospheres in suitable cast iron moulds. The coffee is thus made to assume a tabular shape, and comes into the market in a form resembling chocolate, divided as the latter is by ribs to facilitate breaking into pieces of suitable size for use. The interior surface of the moulds is highly polished, by which artifice the outer crust of the compressed coffee is made sufficiently smooth and hard to prevent the tendency of the ethereal oil of the coffee to escape from the interior of the cakes. The volume of the coffee thus prepared is reduced to less than one third of that of the original. Tea and coffee thus compressed can be packed and transported in tin foil or other packages, preserving their aroma indefinitely.

#### THE ALHAMBRA.

When a thing of special excellence appears on the market there are many who stand ready to assert that the climax has been reached and that it is useless for inventors to look further in that direction; but the folly of such conclusions is everyday proved, and we are forced to believe that no human production is so perfect that it may not, in one way or another, be improved.

In the manufacture of stoves one would have thought it difficult to improve the already existing forms either in design or manner of operation; but in our engraving is represented a fireplace stove, called the "Alhambra," which possesses several novel and valuable points. It not only is an economical and effective heater, but it also is an admirable ventilator. The impure air is drawn into the stove and consumed or escapes through the chimney. The cold air enters the lower part of the stove and passes upward between double walls and escapes, warmed, into the room. An upper room may be warmed by removing the top urn and replacing it with a hot air pipe, which may extend to a register in the floor above.

Owing to its peculiar construction the Alhambra is a successful soft coal burner. It has a combustion chamber back of the fire grate, in which the carbon and gases emitted from the burning coal are consumed, thus avoiding condensation and preventing the formation of the heavy black smoke and fine particles of soot, the usual accompaniments of the combustion of soft coal.

The inventor says that the combustion is so complete that no matter what the length of the pipe or chimney may be, there is neither condensation nor accumulation of soot.

It is stated that a ton of soft coal burned in this stove develops as much heat and lasts as long as a ton of hard or anthracite coal consumed in stoves of other forms, and is capable of burning hard coal with the same facility as the soft.

Open fireplace heaters are made on the same principle and are designated by the same name. These heaters are made to set under the mantel, and are provided with an air chamber behind and above. It combines the principle of air warming of the ordinary fireplace heater with the heating and ventilating principles of the common grate. It has a summer front and blower, which slides back from the center of the front into air-tight iron pockets.

Both forms of this heater have direct and reversible smoke flues, also a double swing hearth and side niches for the poker, shovel and tongs.

The Alhambra was recently patented by Mr. A. T. Bennett, of 101 Lake street, Chicago. Further information may be obtained from the patentee or from Mr. A. P. White, P. O. Box 20, Chicago, Ill., and the stove may be seen at the American Institute Fair.

#### New Inventions.

Mr. Aaron J. Mershon, of Warsaw, Ind., has patented an improved Rock Drilling Machine. This invention relates to certain improvements on the rock drilling machine for which letters patent No. 190,232 were granted to the same inventor May 1, 1877; and it consists in combining with the drill shaft, its lifting arm and the slotted disk wheel, an arm and springs, whereby greater force is applied to the drill on its descending stroke.

Mr. Willis D. Riddick, of Belvidere, N. C., has patented an improved Baling Press, which is particularly intended for pressing cotton, but it may be employed for baling hay and other substances. It consists in an arrangement of a plurality of windlasses, which are so contrived that great pressure is obtained with a small outlay of power.

Mr. James K. Johnston, of St. Louis, Mo., has patented an improved Burglar Alarm. This invention is an improvement upon the device for which letters patent No. 192,698, dated July 3, 1877, have been issued to the same inventor. The object is to provide a stronger, more compact, and also more efficient device.

Mr. Joseph Forman, of Helena, Ky., has patented an improved Car Coupling, which consists of a lever arrangement for raising and dropping the coupling pin from the side or top of the car; and in a swinging and guided frame for lifting the coupling link from the top or side of the car, so that it properly enters the mouth of the connecting draw head.

An improved Razor Strop has been patented by Mr. George W. Brown, of Cumberland Mills (Westbrook), Me. This invention relates to that class of razor strops that are coiled within a case by the action of a spring, and it consists in arranging a spring roll and friction roll with respect to each other, and to an opening in the case, so that the working face of the strop cannot come in contact with the surface of either roll.

Mr. Perry Dickson, of Spearfish City, Dakota Territory, has patented an improved Irrigating Apparatus, by which the water may be distributed at any degree of temperature over the ground, either for the purpose of melting the snow

Mr. Richard Pattin, of Marietta, Ohio, has patented an improved Breast Collar, which is so constructed as to work easier upon the horse than breast collars constructed in the usual way, and which may be placed higher up, so as to be in the most favorable position for the horse to apply his strength to the draught.

Mr. S. Hinckson Bradford, of New York City, has patented an improved Tin Can for condensed milk, paints, and other articles. It has the advantage of being provided with a hinged lid, so that the lid may be raised or lowered with great facility and the contents of the can protected effectively against dust and flies.

Mr. Miles Puckett, of Walesca, Ga., has patented an improved Washing Machine, which is simple in construction, convenient, and effective. It will wash the clothes without injuring them, and with a comparatively small amount of labor.

Mr. Benjamin F. Buxton, of Brookfield, Vt., has patented an improved apparatus by which moist rubber and other boots, shoes, mittens, and similar articles may be dried perfectly, without any objectionable odor in the room. It consists of a box having a draught tube connected to the chimney and bottom tubes with lower perforated elbows, adjustable end pieces, and suspension devices for the boots or shoes, so that the draught established at the interior draws off the moisture and odor.

Mr. Joseph W. Blosser, of Sarcoxie, Mo., has patented an effective Catarrh Remedy, to be utilized either in the form of small cakes by chewing, or in the form of medicated fumes by smoking it like tobacco in a pipe or cigarette, and inhaling, swallowing, or blowing out the smoke through the nostrils, or as the state and location of the disease may require.

An improved Horse Collar has been patented by Mr. Andrew D. Martin, of Abbeville, La. This collar is made by winding moss, hemp, flax, or cotton twine or cord around a flexible base, such as rope, until it is of the proper shape and proportions for a horse collar, when the rope is bent around to the required oval shape and the ends secured. The shoulder for the hames is formed by winding twine evenly upon a base similar to the collar, but smaller, and attaching the rope thus wound to the inner edge of the main collar.

Messrs. Loren M. Webb and Edwin Tinker, of Tuscarora, N. Y., have patented an improved Car Coupling, in which the coupling pin is guided in a cylindrical pin guide or barrel at the top of the draw head, and supported by an extension of the sliding front plate until the same is pushed back by the link. Transverse ribs at the face of the front slide plate serve to hold the link in position for coupling, while a hand lever that engages one of the side plates sets the ribbed front plate forward or backward on the center guide block.

Mr. Thomas C. Veale, of New York City, has patented an improved Combination Barrel. The foundation of the barrel is made of a single thickness of veneer, and in one or more pieces, the edges of which are jointed to each other, and the joints or seams are covered upon the outside with strips of muslin cemented to the veneer. The barrel is covered with a coating of cement, glue, or other suitable adhesive, and is then wrapped with paper, which has been coated or saturated with cement long enough to have swelled. The cover or head is formed of two thicknesses of wood, of unequal diameter, and is applied in a novel manner.

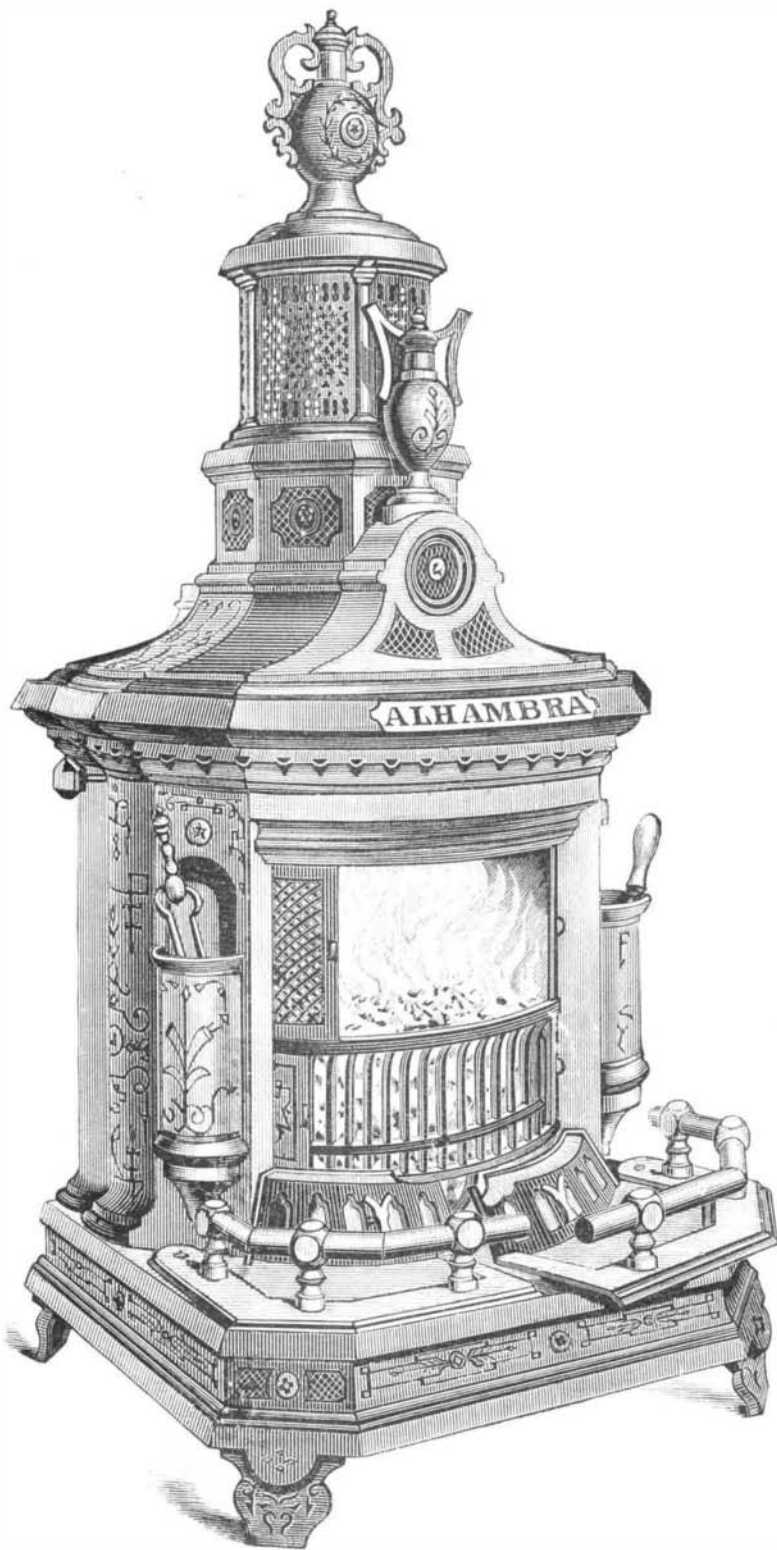
An improved Spring Seat for Wagons has been patented by Mr. John B. Gorrell, of La Otto, Ind. The object of this invention is to

improve the construction of that class of wagon seats which are supported upon spiral springs, so that they shall not be dependent upon the springs to steady the seat, but the latter may be firmly supported and yet suspended so as to allow of its free oscillation laterally to counteract the effect of the jolting movements of the wagon.

Mr. Montgomery R. Davis, of Jackson, Mich., has patented an improved Spring Bed Bottom, which is simple and easily adjusted, so as to make it wider or narrower.

Mr. Joseph Adams, of Washington, D. C., has patented an improvement in Gas Regulators designed to increase, diminish, or entirely cut off the supply of gas in an automatic regulator from any portion of the building, and without descending to the meter or place where the regulator is, and designed also to obviate leakage of gas in the regulator.

THE village of Kollmar, near Gluckstadt, in Holstein, which is situated in a district reputed for its healthiness, has just witnessed the diamond wedding, or the 75th marriage anniversary, of two of its 1,400 parishioners. Two more diamond weddings are impending, and the last fourteen years have seen ten such celebrations there.



THE FIREPLACE STOVE ALHAMBRA.

and taking the frost out of the ground, or for scalding the seeds of weeds and killing worms, grasshopper eggs, and other insects, or for accelerating the growth of the plants, when the ground is prepared, by distributing water in a warm state during the cold nights, so as to supply a sufficient degree of heat to the ground, whereby the growing of the vegetables and other plants is accelerated in a high degree.

An improved Scarf has been patented by Mr. Morris Henschel, of New York City. The object of this invention is to furnish for scarfs of all kinds an adjustable center piece, which may be readily adjusted whenever its edge is worn out or soiled, so as to expose a new and unsoiled edge and impart to the scarf a neat and clean appearance until it is entirely worn out.

An improved Brake for Railway Cars has been patented by Mr. Willard R. Green, of Muscatine, Iowa. This invention consists in a novel arrangement of coupling mechanism, connecting rods, and various other devices, in connection with the brake mechanism, whereby provision is made for operating the brakes of all the cars in a train by power applied from the engine.