### A HYDROCARBON BURNER FOR STOVES, ETC.

A simple and efficient burner which may be readily applied to various shapes of stoves, and is designed to furnish a great heat at small cost, is shown in the accompanying illustration. Bolted to and extending entirely around the inner side of the stove casing is a narrow flanged ledge, upon which rests the stack, having a curved and forwardly projecting hinged back. Within the stack is an oil box, supported upon a transverse bar suspended by bolts from the ledge, the distance between the bar and ledge being adjustable. The oil box has a central oil chamber in its upper face and vertical flanges around its edges, while a feed pipe extending through an opening in the front of the stove casing bends upwardly through an aperture in the base of the box, the upper end of the pipe having lateral perforations in a chamber beneath the deflector, which fits closely between the flanges of the oil box. The deflector fits within and is bolted to the flanges of the oil box, is open at both ends and on the front side, and is provided with bottom perforations to admit oil, while the lower part of the deflector is completely filled with a wick of closely coiled wire or similar indestructible material, the packing of the wire being designed to facilitate the passage of oil vapor upward through it. A steam pipe with perforations on its sides extends horizontally through the upper rear part of the deflector, just above the wick, and beneath the pipe is a dish-shaped steam pan, designed to throw the steam to the front side of the burner, and catch any drops of water, which will be quickly turned into steam by the heat of the pan. Sufficient oil having been fed to flow upward into the wick, it is lighted and the steam turned on, after which the feed is regulated so that the oil will only pass a little above the bottom of the deflector, the oil being vaporized by the heat of the wick, when the oil vapor and steam are combined in a gas which burns brightly, the flame issuing from beneath the front and ends of the top plate of the deflector. This improvement is designed to be readily fitted to any style of stove casing, and, when located near a flue, chimney, or other air passage, is designed also to afford an excellent ventilator for living and cooking apartments. The parts liable to deterioration are but few, and can be readily replaced without the aid of a skilled workman.

For further information relative to this invention, address the patentee, Mr. Charles E. Cookerly, or Mr. Grant Davidson, of Kansas City, Mo.

### THE SYSTEM OF MILITARY DOVECOTES IN EUROPE.

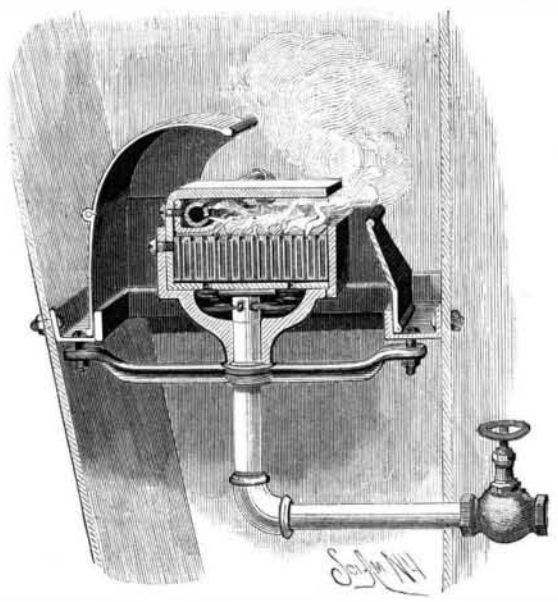
In the organization of the system of military dovecotes, the locations of the stations are, almost all of them, decided upon in advance. It is a question, in fact, of connecting the fortresses of the frontier with each other and with a central station. There is generally no difficulty with fortresses that are almost always so near each other that ordinary pigeons can easily effect a passage from one to the other. The same is not the case with the central station, at least in great empires, such as Russia, Germany, etc. In this case it is necessary to establish relay stations between the frontier and the center of the system.

One has, in fact, to stand between two dangers, viz., on the one hand, of having journeys to be made that exceed the strength of the average of pigeons, and, on the other, of too greatly multiplying the stations and consequently the loss of time that always occurs at the start, when the bird is taking its bearings, or on reaching home, when it is hesitating to enter its cote. The superiority of communications by pigeons over other methods of transmitting dispatches increases with the distance. Thus a direct train takes thirteen hours to make the 300 miles that separate Paris from Lyons—a distance that can be traversed in eight or nine hours by a pigeon.

It is generally admitted that it is possible, almost to a certainty, to make an ordinary pigeon (such as those with which the military cotes are stocked), provided that it has been carried away, accomplish a journey of from 30 to 90 miles in a single stage, and that, too, in a space of time varying from one hour to four hours. The nature of the country has a great influence upon the facilities of the trip, not only on account of the obstacles presented by chains of mountains, but also by the delays and dangers that pursuit by birds of prey cause the messengers to undergo. A journey of 180 miles over a level country will be more easily made than one of 60 over a hilly one.

So, in the details given further along as to the various systems, we shall see that, by way of exception, it has been possible to carry the distance between two stations up to 180, and even 240 miles.

When stations have to be established upon mountains, it is necessary to install them, not upon the highest points, even though they would thus have the advantange of being discernible, but in the valleys and at the side of the roads, for it is through the necks where these valleys and roads end that the pigeons always endeavor to cross chains of mountains, provided the latter exceed the mean altitude of flight.



COOKERLY'S HYDROCARBON BURNER.

In certain countries, the military pigeons are carried away only at the beginning of spring, just as are the ordinary carriers, the sole objective of which is contests in the races of autumn. This is an error, for, in time of war, it is necessary that the messengers of the fortresses shall be habituated to brave inclement weather. The Societe Estafette Lyonnaise, this past winter (1890–91), made an experiment in this direction. It lost 43 per cent of the pigeons, but the number of these that arrived permits of the hope that, with proper precautions, this service will enter into practice. Further along, we shall see that what took place at the time of the siege of Paris confirms this favorable opinion.

In every station there must be as many dovecotes, or at least as many distinct parts of a dovecote, as there are corresponding stations, so that it shall be always the same pigeons that are carried away in the same direction.

At the age of six months, these pigeons come to know their way so well that, for distances of 120 miles, there is, taking into consideration storms, the shot of hunters, and the claws of rapacious birds, one chance in three that they will reach their destination. In order to be sure that a dispatch will be transmitted, it will suffice, then, to confide it to three messengers, or to four at the most, during unfavorable winds or weather. From this it results that if we wish to be able to send a message every day during an investment of six months or 180 days, it will be necessary to have an effective force of 180 by 4, or 720 pigeons for each station with which it is desired to communicate, the distance of such stations being less than 120 miles. If the distance is greater than this, we can no longer depend upon six months' old pigeons, whose strength and rearing are generally inadequate, but it will be necessary to have recourse then to pigeons of one, two, three, and even four years, when the journey to be accomplished reaches 240 miles. It will be well at the same time to increase the number of carriers of the same dispatch. As a general thing, it is necessary to employ one pigeon more for each extra 30 miles, so that, for example, for 150 miles we would let loose 5 pigeons of from 1 to 2 years; for 180 miles, 6 pigeons of from 2 to 3 years; for 210 miles, 7 pigeons of from 3 to 4 years; and for 240 miles, 8 pigeons of from 3 to 4 years.

These figures are only approximate, for the value of a pigeon does not always depend upon its age. One that is excellent for service in rainy weather may be worth nothing in a wind, and *vice versa*. It is, therefore, of prime necessity that the keepers of military dovecotes shall make it a point to know personally all the birds in their charge, and to take note of their aptitude.

The installation of military dovecotes is about the same throughout Europe. Sometimes they are established in isolated pavilions and sometimes in the upper stories of magazines or barracks.

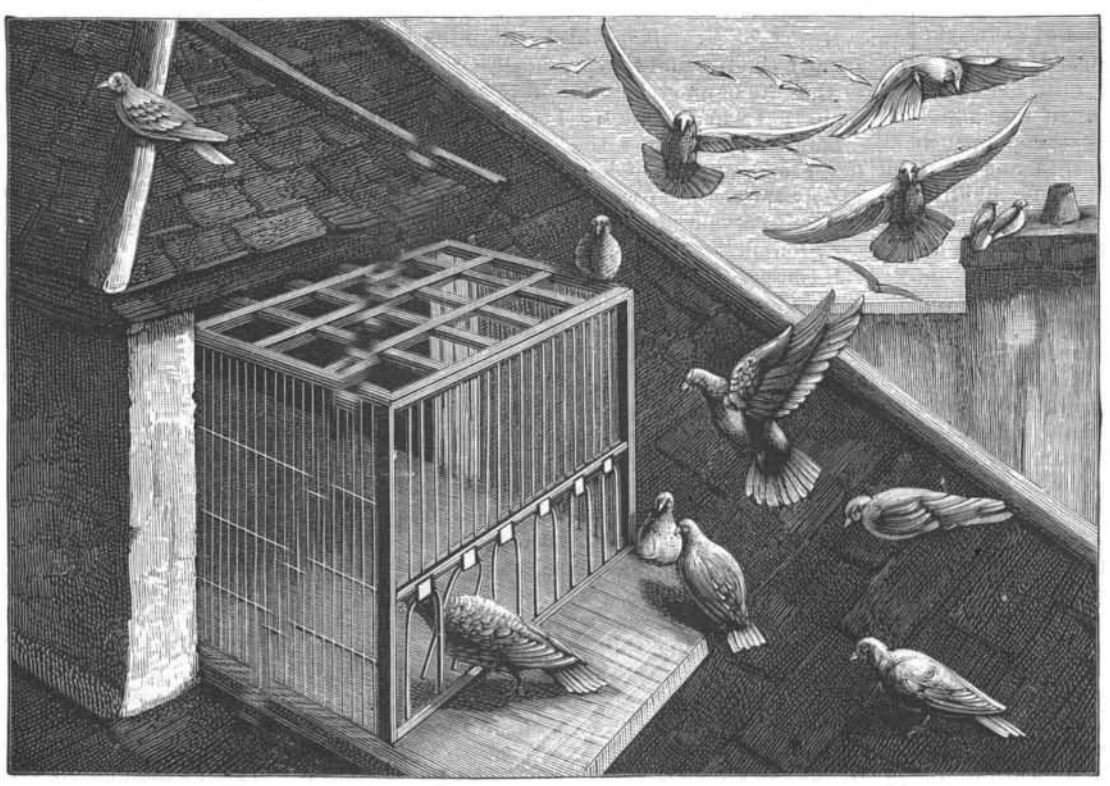
The cut represents the military dovecote of Grenoble that I have had installed in the upper story of a tower of the ancient wall built in 1401. Attention should be especially directed to the safety of the birds, which should be carefully protected against the attack of cats, rats, or other carnivorous animals.

Each dovecote should be provided with several compartments. First, there is the apartment for paired pigeons, in which the birds generally remain when they re-enter the cote. Each pair has its own cage, the height and length of which is twenty inches, while the width is from twenty-four to twenty-eight inches. Two plaster nests are placed in each cage, one of which will serve for the young, while the other will contain the eggs.

Just alongside there should be a second apartment, fitted, or not, with cages. The pigeons are confined in this in the month of October, the epoch at which the males should be separated from the females. A little further along is the infirmary, into which all sick pigeons are put, so that they may not communicate the disease with which they are afflicted to the other birds.

Finally, the entrance cage completes the installation of every dovecote. Generally, this cage is placed at the window of the apartment for paired birds and communicates therewith. Little swinging wickets allow the birds to go in and out. A bar put in place by the keeper prevents the wickets from moving in both directions at certain moments, and then permits the birds only to enter the cote.

In order to give the pigeons more air, and, at the same time, to allow the keepers to seize them easily, rooms are selected that have a sufficiently high ceiling, and in these are established, at a height of six feet, a second and open ceiling of laths, which prevents the birds from flying out of reach of the hand.



ENTRANCE CAGE OF A FRENCH MILITARY DOVECOTE.

Clay and bits of wood are placed within reach of the pigeons in order to permit them to build their nests. In the interior of the cote there are wooden trays for seeds, and leaden troughs, or small apparatus of special form, for water. The food consists of vetches, beans, and Indian corn. Cereals, hempseed, and a little salt may also be given. The birds complete their ordinary fare by swallowing grains of sand or small pebbles.

Three meals a day are served to them in summer—one at 5 o'clock in the morning, one at noon, and one at 6 o'clock in the evening. In winter they are fed but twice a day—at noon and at 5 o'clock. It costs from 25 to 30 cents per month to keep each pigeon.

Thus treated, the birds reach their complete development in three years, and are capable of performing good service as messengers until the age of fifteen or sixteen years. They have been known to attain a longevity of twenty years, but it is between the ages of two and six years that they display all their qualities.

For carrying the pigeons away from the military dovecotes, it is well, the first year, to adopt the following rule:

The distance of a letting loose of the birds will be obtained by adding to the distance of the preceding

one a half of such distance, being expressed by the formula

$$Dn = Dn - 1 + \frac{Dn - 1}{2}$$

Thus the first turning loose being say 10 miles, the second will be 10 + 5 = 15 miles, the third will be 15 + 7½, and so on up to 120 or 180 miles, that is to say, up to the distance that the messengers are never to exceed.

As soon as a mobilization of the army has been decreed, there will be taken from each cote all the pigeons that are carried in the direction of the neighboring places, and these will be conveyed respectively to such places along with the men who are accustomed to care for them, and who must remain there until the cessation of hostilities.

All these permutations must be effected on the same day, so that every lot of pigeons shall find the place free on arriving.

In a succeeding article I shall give a few as complete details as possible as to the systems of military dovecotes of the principal powers of Europe.

Such data, however, will be merely approximate, since it is for the interest of every state not to allow its neighbors to become too accurately informed as to what is going on within its borders, and not to divulge its processes.—*Lt. Col. De Rochas, in La Nature.*

## PNEUMATIC SIGNALING UPON THE CENTRAL RAILROAD OF NEW JERSEY.

The Westinghouse automatic signaling system, now in daily operation upon the Central Railroad of New Jersey, has already been described in our columns. We illustrate in the present issue some further features of its operation, touching more especially upon the details of its electric and pneumatic connections.

The line of road operated by it is divided into blocks. From motives of safety these blocks should be as long as possible, but in the present case the number of trains which pass over the road necessitate short blocking, each block being from 1,000 to 2,500 feet long. Two semaphore signals are used at the beginning of each block. One indicates "caution" when the next block but one has a train upon it; the next indicates "danger" when the next block has a train upon it. The semaphore indicating danger is termed the "home" signal, the other the "distant" signal. The upper one is the home signal, the lower is the distant one.

The system in general terms operates by pneumatic pressure. The operating valves of the air pressure pipes are opened and shut by the agency of an electric current. The rails are used as part of the circuits for the current. To them the wires are connected by pins driven into holes drilled in the web of the rail. This method of connection is shown in one of the cuts. Where the rails abut, if they are to be connected electrically, a short piece of copper wire is carried across the joint and connected in like manner by two pins, one driven into a hole in the web of each rail.

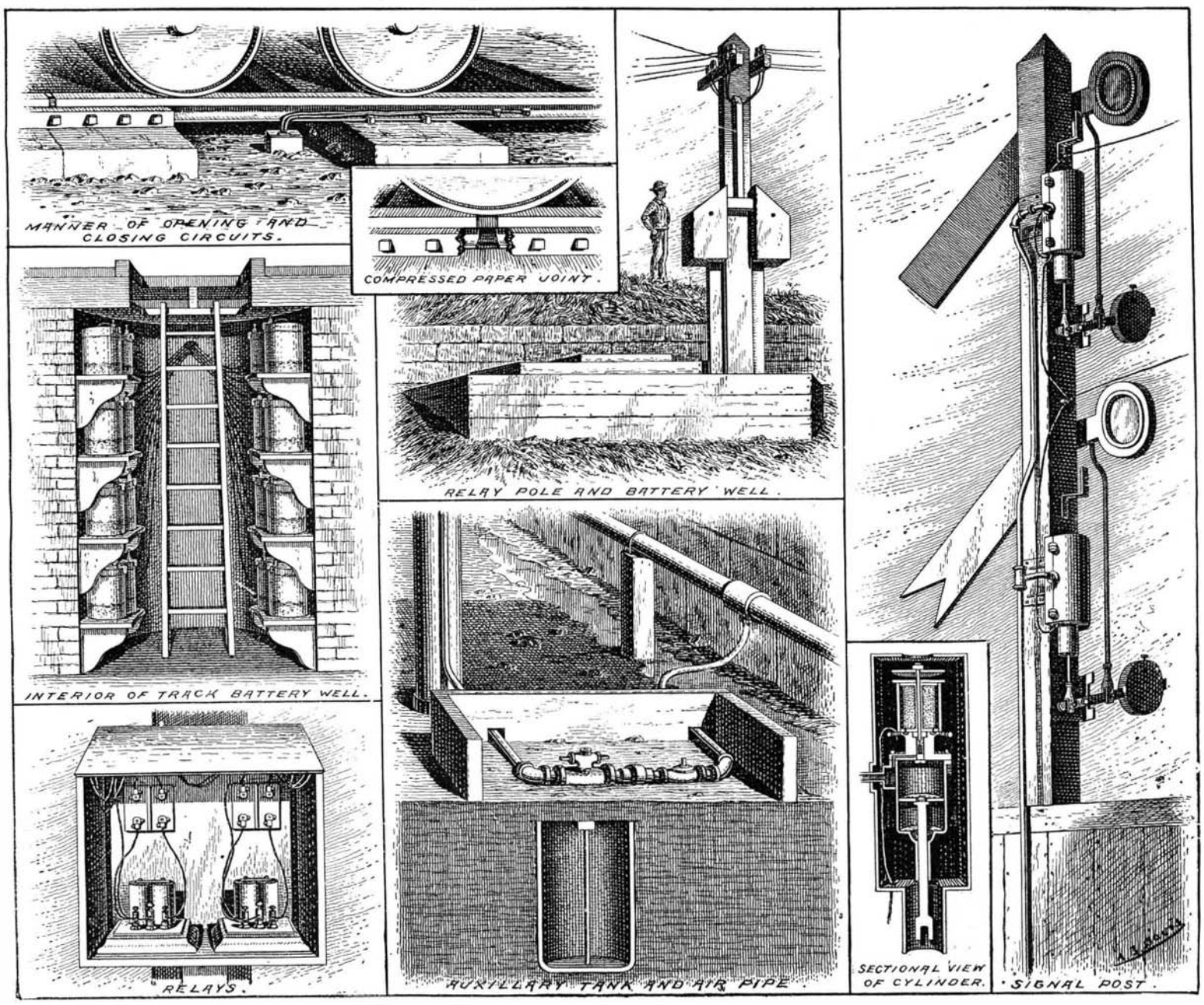
Each block has to be insulated from its neighbor. In order to secure this, compressed layers of paper are inserted between the ends of the rails, as shown in the cut.

The electric batteries are established in little cisterns or wells, underground, along the side of the road. The gravity battery is used, and as it is on closed circuit much of the time, it is maintained in good condition. Over each well is the relay pole, whence wires run to the semaphore poles. The relays, battery and well, and a relay pole are also shown. The well is large enough to give ample room for an operative to clean, refill, or charge the batteries as required.

A semaphore pole is placed near the beginning of each block. It carries two semaphores. Each is raised to "danger" or "caution" by a counterweight. A pneumatic cylinder and piston is connected to the arm of the counterweight in such a way that as long as the air pressure is maintained the signal remains at safety. The air pressure is turned on by an electrically controlled valve, which, with its solenoid and armature, is seen in the cut immediately above the piston. Hence for air pressure to act upon the piston the solenoid must be excited. To secure quick action of the pneumatic cylinders, air reservoirs are established at intervals along the track. These obviate the necessity of air passing through long lines of pipe, with attendant friction and "wire drawing." Thus prompt action is secured.

The trains by bridging the tracks operate the electric circuits. As long as everything is intact and the tracks are empty the solenoids are excited, their armatures are depressed, and the air valves are open. The air depresses the piston and forces the semaphores into the safety position. If an engine or train enters upon a block it short-circuits the solenoids, affecting the danger signal for its own and the caution signal for the block behind it. The air valves move and the air escapes from the pneumatic cylinders, and the semaphores drop into "caution" and "danger" positions respectively. As the train leaves the block, the distant caution signal circuit ceases to be short-circuited, the air valve is shifted, and the signal is forced by pneumatic pressure into safety again. The danger signal immediately back of the block it is leaving is affected in like manner, and the two semaphores next in advance drop into the position of warning.

The great point about the system is that the work of the whole apparatus is holding the signals at safety. If anything happens to break a connection, if the air pipes leak or are fractured, or if any interference is suffered so that the apparatus ceases to act, every signal falls at once into "caution" and "danger." It is in this respect that the perfection of the system appears in the strongest light. An accident, which makes it inoperative at once, signals a full stoppage to every train upon the road.




PNEUMATIC SIGNALING ON THE CENTRAL RAILROAD OF NEW JERSEY.

## The Steel Steamer Roman.

The steel steamer Roman, built to the order of the Menominee Transit Co. by the Globe Iron Works Co., Cleveland, O., was lately launched from the yards of her builders.

The Roman is the last of a fleet of six high classed, full powered steel steamers built by the "Globe" for the same owners, and named respectively the Norman, Saxon, German, Briton, Grecian, and Roman.

The dimensions of the Roman are as follows: 312 feet 6 inches over all; 296 feet 6 inches keel; 40 feet beam and 24 feet 6 inches moulded depth. Engines, triple expansion, with cylinders 24, 38, and 61 by 42 inch stroke; two Scotch type boilers 12 feet 6 inches in diameter by 14 feet in length, for a working pressure of 160 pounds; her propeller wheel is 14 feet in diameter, with a lead of 17 feet. She is estimated to carry 3,000 tons on a 15 foot 6 inch draught. Her coefficient of fineness is 0·81, which proves that her machinery is very superior to obtain the maximum speed which she is guaranteed for. It is estimated that she will consume 1·70 pounds of coal, developing an I. H. P. of 1,870. She has four water tight compartments, including the collision bulkheads; her upper deck is of steel, lap-plated with thwartship seams and double riveted butt straps of three-eighths steel; her stringer plates are also double strapped and triple riveted; main deck of four inch pine.

THE law of the United States is that bridges over navigable streams must be built under the sanction of the War Department. The law is to be more vigorously enforced than formerly.