French Wine Production of 1900.

The wine production of France for the year 1900 is 1,721,000,000 gallons, a yield that has only been exceeded three times in the past century. The promise of a large yield was so great in August that sales were made at less than a dollar per barrel for a good table wine. Of course, the high-grade wines brought large prices. Since early in the seventies up to 1900 there has been a great demand for American plants for grafting upon French vines. In 1881 the total area replanted with American vines was 21,262 acres; in 1889 it was 471,000 acres, and to-day it is 2,414,495 acres. The old vineyards which were destroyed by the phylloxera have been "reconstituted," as the French say, by graftings from the United States, and it is believed that they are now phylloxera-proof. The acreage planted in vines in France has been steadily increasing during the last twenty years, but there are reasons for believing that it has come to a standstill. The organs of the wine growers advise that attention be paid now to quality and not quantity. It is probable that the octroi tax will be abolished within a few months, and wine will enter the gates of all the cities of France duty free. It is hoped that this will have the effect of increasing the sale of wine and decreasing the consumption of alcoholic liquor. If the production of wine remains stationary more land will be devoted to the raising of early fruits and vegetables. The planting of mulberry trees and the raising of the silkworm will receive more attention. Wine is now produced more cheaply in California than in France, and the efforts to introduce French wines into Japan have not been effectual on account of Californian competition, the Japanese declaring they can buy wine cheaper in San Francisco than in France. The grape growers of France expect an absolute immunity from losses by hail by the use of cannon, and a newspaper which is the organ of the hail destroyers has just made its appearance.

Experiments have been carried on at Cape Town in which motors are used for transporting Maxim guns. The gun was mounted on a platform and occupied the front seat of a quadricycle.

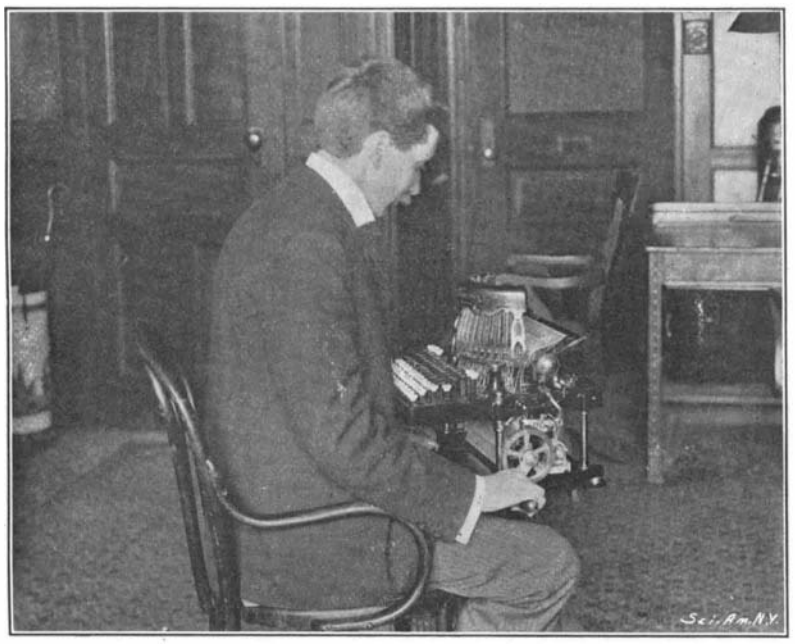
THE MURRAY PAGE-PRINTING TELEGRAPH.

The valuable invention which forms the subject of the present article is the work of a young Australian journalist; and it takes on particular interest from the fact that its author at the time he entered upon the investigation which has resulted so successfully was absolutely without knowledge of telegraphy. The earlier experiments were carried on in Sydney, and as soon as Mr. Murray had satisfied himself that his system was mechanically and operatively practical, he left at once for the United States for the purpose of securing his patents and introducing his system. His success has been thorough and rapid, for while his many applications for foreign patents were still pending, he made arrangements with the Postal Telegraph Company for the exclusive telegraphic rights to his invention in the United States.

Among the problems connected with telegraphy which have commanded the earnest efforts of inventors is that of automatically printing messages in the Roman characters. From time to time we have illustrated, either in the SCIENTIFIC AMERICAN or the SUPPLEMENT, the most successful inventions in this difficult but fascinating field of investigation. The demands of telegraphy are so various that it is not to be expected that any single printing telegraph can be produced that will answer for every class of telegraphic work, and all the machines of the kind that are in use, or proposed, belong to one or other of three or four types.

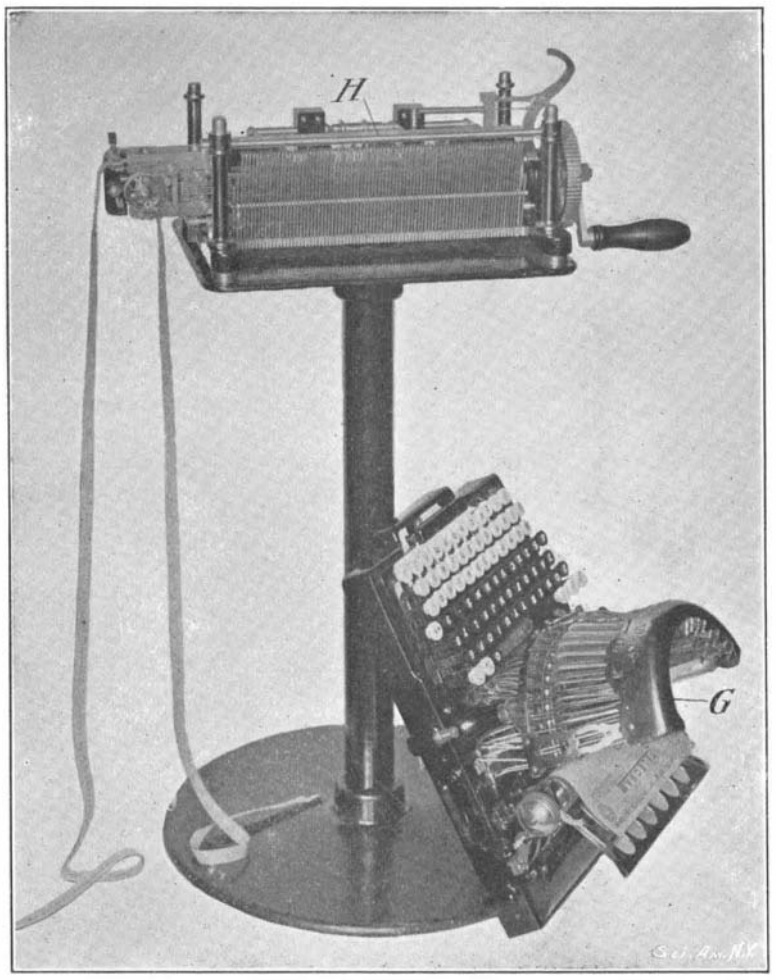
The simplest form of printing telegraph is the well-known "stock-ticker," the perfected form of which is found in the Burry page-printing telegraph, which was illustrated in the SCIENTIFIC AMERICAN of March 23, 1901. These machines, although they might be used in long-distance telegraphy, are designed more particularly for city use in the disseminating of news from a central station to a large number of separate private offices. Another class of printing telegraphs is that which is devoted mainly to long-distance telegraphy, as represented by the vast business of the leading telegraph companies, where speed and accuracy become of prime importance. It is only within the last year or two that efficient machines of this class have been perfected. One of these, invented by Donald Murray, is in use by the Postal Telegraph Company, and another, invented by Charles L. Buckingham, is being operated by the Western Union Company. In the same class are Rowland's and Baudot's multiplex-printing systems. Another class of telegraphy, to which belong the Delaney, the Squier and Crehore, and the Pollak-Virag, has not as yet established itself commercially; for with its speed of over a thousand words a minute, it is perhaps ahead of its time, since there is not sufficient telegraphic business of the kind required to keep such systems going at this enormous rate of speed.

It is impossible within the space at our disposal in the SCIENTIFIC AMERICAN to give a detailed description of Murray's most ingenious and successful telegraph. For this the reader is referred to a paper recently presented before the American Institute of Electrical Engineers, which is given in full in the SCIENTIFIC AMERICAN SUPPLEMENT of February 2 and February 9 of this year. The accompanying diagrams and photographs, however, show a complete installation, from the keyboard perforator at the sending station to the printer at the receiving station, and the subjoined description is sufficiently ample



Typewriter, with mechanical attachment, at the receiving station, on which, by the turning of a crank, the message is translated from the perforated characters on the tape to the printed characters on the page.

MR. MURRAY OPERATING A RECEIVING STATION PRINTER.



The typewriter, *G*, is removed to show the interlocking mechanism, *H*, by which the perforated characters on the tape are made to strike the keys of the Roman alphabet on the typewriter.

RECEIVING STATION PRINTER.

At the transmitting station the blank tape is punched with perforated characters in typewriter punching machine, *A*; then run through a modified Wheatstone transmitter, *B*. At the receiving station the impulses are controlled by relays, *C*, and a vibrator, *D*. and operate a punching magnet, *F*, which reproduces the perforated characters upon a blank tape. This tape is then run through an attachment, *H*, to a typewriter, *G*, which latter prints the message in page form in the Roman characters.

COMPLETE SET OF MURRAY PAGE-PRINTING TELEGRAPH APPARATUS—HIGHEST SPEED 130 WORDS PER MINUTE.

to give a comprehensive idea of the principles and operation of the system.

The fundamental feature in the Murray system is the use of a perforated tape, which is divided lineally into exactly equal spaces of half an inch, each space representing a character. Each character-space is theoretically divided into five subdivisions, and the characters are determined by the number and sequence of the perforations in each letter-space. The perforated tape is run through a modified Wheatstone transmitter at the transmitting station, and the impulses, thus set up, serve to operate a magnetic perforator at the receiving station, which produces a facsimile of the transmitting tape by means of a punching magnet whose strokes correspond in frequency with the impulses received. The perforated tape produced at the receiving station is then run through a printer, whose operation is substantially the same as that of a pianola or automatic piano.

The punching machine, *A*, which in appearance is not unlike a typewriter, is so constructed that, as the tape is run through the machine, the striking of each key makes the proper combination of perforations in each half inch of character space. The prepared tape is ruled off into half-inch spaces and has a central line of fine perforations, which serves to engage the feed-wheels in the puncher and transmitter. There are ten small punchers, which are so arranged that five of them register on each side of the central line of perforations just referred to, and it can be easily understood that by the use of a system of interlocking bars the desired combination of punchers can be driven down at the stroke of each key. In all, 84 different characters may be punched.

As soon as a message has been punched by the operator, it is torn off by a boy who inserts it in a modified Wheatstone transmitter, *B*, which performs the functions of an ordinary telegraphic key. The tape is fed by means of an electrical pendulum-motor, driving a small star-wheel, which engages the central line of perforations and draws the tape through the machine. As the tape advances, the prickers, 4 and 5, which are located in line with the advancing lines of perforations in the tape, pass up through the perforations, and by their vertical oscillation give movement to reciprocating rods, 6 and 7, which serve to engage respectively with opposite terminals of a switch-arm, 8. The impulses thus set up are transmitted, let us say, from Chicago to New York, where they repeat, in sequence and frequency, the combinations of perforations in the tape. At the receiving station there is a main line relay, which governs a punching magnet in the perforator, *F*; also a governing relay, which maintains unison between the main-line impulses as they arrive and the corresponding impulses in the local circuit. This group of relays is indicated in our photograph by letter *C*. The local impulses are created by a vibrating reed (*D*, in photograph—11, diagram). The impulses as received at New York are utilized to perforate a blank tape which is a facsimile of the tape used in transmitting from Chicago.

The perforator, *F*, consists of a punching magnet and a spacing magnet. The tape is fed into the machine by a star-wheel (35, diagram) which is driven by a small motor; upon the same shaft as the star-wheel is an escapement controlled by the spacing magnet. The vibrating reed, 11, makes and breaks the local circuit of the spacing magnet. The impulses are so utilized, electrically, that the tape, as it leaves the machine exhibits perforations corresponding to those sent out from the Wheatstone transmitter at Chicago. The next operation is the important one of automatically transferring the perforated characters on the tape to a printing machine, which produces them in page form in the Roman characters. This is done by means of a typewriter, *G*, whose key levers are operated by an exceedingly ingenious combination of five transverse locking combs and a set of vertically-oscillating levers (41, in diagram; also *H*, in photograph). The combs terminate in five pointed rods, 40, the ends of the rods registering with five perforations in a plate, 38. The tape is caused to travel between the perforations in the plate and the pointed ends of the combs, the tape being drawn along a half-inch, or the length of one character, at each step. At the instant when the perforations of the tape coincide with the pointed ends of the bars, the plate is brought forward. Only those combs are moved longitudinally whose pointed ends correspond with the unperforated subdivisions of the tape, the other points projecting through the perforations in the tape and the die, and remaining stationary. Without pursuing the description any further, it can be seen at once, by reference to the diagrams, that the combinations thus formed of notches, 39, on the upper edge of the combs with the vertically oscillating strips, 41, above them, will result in the proper key lever from the typewriter above dropping into the clear groove thus formed. The moment it does this, a motor-driven cam engages it, produces a movement of the typewriter lever, and so prints the Roman character desired.

Such, in brief, is the system employed by Mr. Murray, and in the long-distance tests which have been made between Chicago and New York and Boston and New York a speed of 102 words per minute has been realized; and on a line 384 miles long, a speed of 125 words per minute. In the most recent working test by the Postal Telegraph Company a speed of 130 words per minute was attained. When the system is running at this latter speed twelve operators are required, six at each end; at lower speeds correspondingly fewer operators are needed. Although only one perforating machine is shown in our photographic view of the apparatus, there are three actually required to produce the perforated tape fast enough to match the full capacity of the system. Mr. Murray does not claim that there is any great saving of labor, but that there is an enormous saving of wire. The cost of a single copper wire from New York to Chicago is $60,000, and the system just described easily doubles and even trebles the capacity of the line. With regard to the increase in speed, it may be mentioned that the best Morse operators send fifty messages an hour, and as the messages average thirty words, this corresponds to a rate of twenty-five words a minute. As a matter of fact, fifteen words per minute is a fair average speed for a day's work. Working quadruplex it is good work for eight men, four at each end, to send a total of eighty words a minute; whereas by the Murray system it is possible to send 240 words per minute, or 120 words each way.

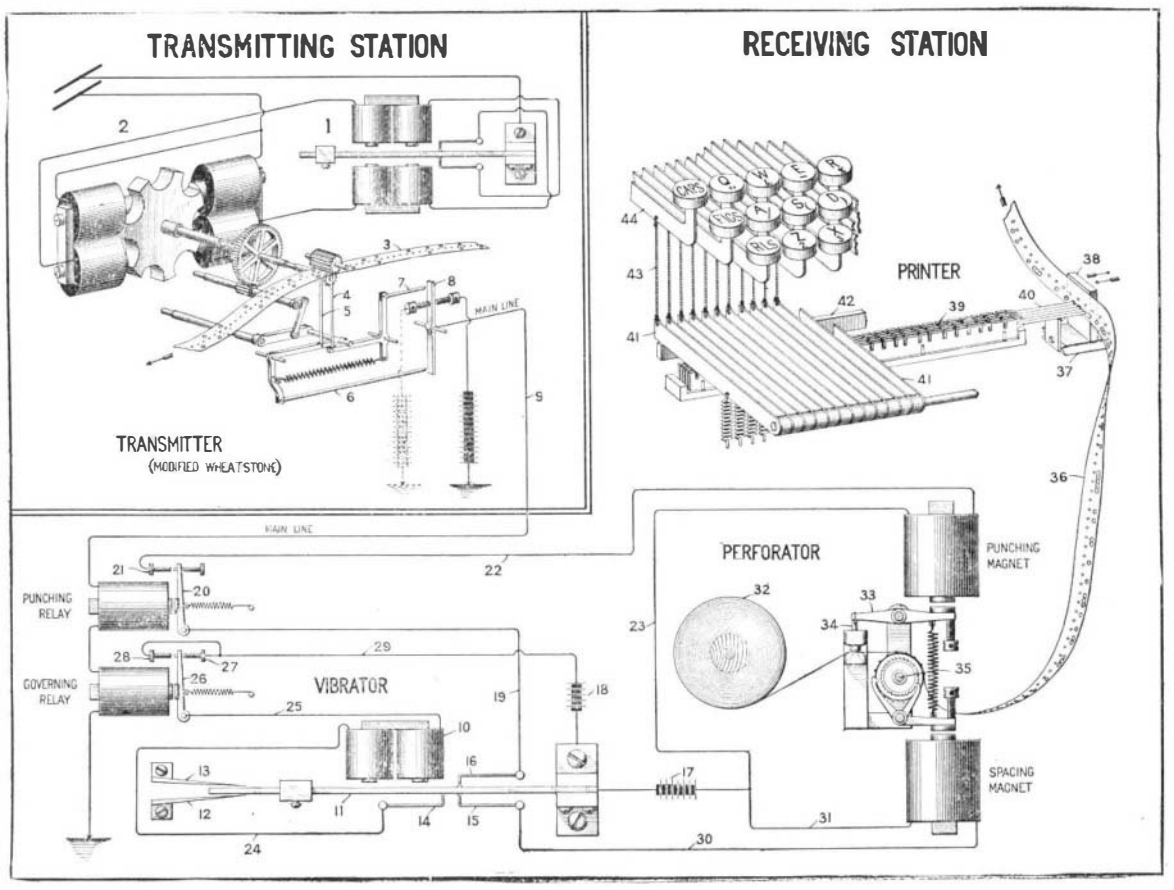


DIAGRAM OF PAGE-PRINTING TELEGRAPH APPARATUS.

The Havana Western Railway is trying to induce planters to begin cotton growing in the Island of Cuba. It has procured a quantity of seed from Egypt and the sea island plantations of Georgia and sections of Mississippi Valley, and is having a pamphlet printed in Spanish for distribution with the seed which is to be freely given out to planters or owners along the line who are willing to experiment with the fiber. If a sufficient number plant the seed the railroad will put up a cotton gin and all the necessary machinery for the convenience of growers at convenient points. Cotton was cultivated extensively in the district fifty years ago, and to-day cotton trees 20 feet high are to be found growing wild in many parts of the district, the fiber, however, being coarse and green.

Composition of Meteorite.

In a paper lately read before the Académie des Sciences, M. Stanislas Meunier gives an account of a chemical and mineralogical examination made upon a meteorite which fell at Lançon, in the south of France. The meteorite in question weighs about a pound and a half, and is of a light ash-gray, contrasting with the deep black of the surface layer which formed upon it during its traject through the air. Upon the body of the meteorite proper are seen a number of approximately parallel black lines which are only the outer edges of strata which traverse the mass. These strata have been formed at an early period under the influence of local heating and a resulting transformation of the rock, and are of the same character as the black surface layer recently formed by the heating of the rock due to air friction. The author finds that the density of the meteorite, taken in six portions weighing in all 50 grains, is 3.482 at 12 deg. C. He then analyzed it, first taking out the iron by means of the magnet. Of 30.8 grains which were finely pulverized in an agate mortar, the magnet took out 2.7 of iron in fine grains which were quite malleable, this being 8.8 per cent of the whole. In spite of their abundance in the mass, these grains are almost invisible on the breakage surfaces of the meteorite, but they appear very clearly when the surface is polished; under the microscope their forms are clearly seen, and these are quite remarkable. In the present case they are more compact than the granules observed in many other meteorites, and although ramified in form, they are less abundant in filaments and membraneous parts embracing the rock elements. Often they present angular profiles in some parts of their contours, which likens them to crystals, especially as the angles often approach 90 degrees. These grains are found to contain nickel in the proportion of 8.2 per cent. Before analyzing the rocky portion, some tests were made to separate it from the metallic minerals of a non-magnetic character. A notable quantity of combined sulphur was found in the course of the operation, for the fine dust, when acted upon by hydrochloric acid, disengaged a considerable amount of hydrogen sulphide. By a series of reactions, 6.35 per cent of pyrrhotine was found. In the present case this pyrrhotine is in the form of very fine grains and is distributed throughout the whole mass. Besides sulphate of iron, the rock contains small black grains which are visible in certain parts of it when viewed in thin sections; these grains, when separated, were found to consist almost exclusively of chrome iron, and its proportion is 0.54 per cent. As regards the stony or silicated part of the rock, a partial analysis was made by treating it with hydrochloric acid and thus separating it into a soluble and an insoluble part. The soluble part contained silica, manganese, iron and nickel, and is undoubtedly formed of peridot, especially as a microscopic examination of the rock in thin sections shows an abundance of this mineral in well characterized form. The insoluble part is more complex, and upon microscopic examination is considered to be a mixture of pyroxenic minerals, and especialy of enstatite with a small proportion of aluminous minerals (plagioclase). The final result shows the meteorite to be composed as follows: Iron (with nickel), 8.80 per cent; pyrrhotine, 6.35; chrome iron, 0.54; enstatite (with plagioclase), 52.21; peridot (by difference), 32.10 per cent.

An incandescent electric lamp with two independent filaments is being made in this country. One of these is to be used at ordinary times, while the other, which develops much less candle power, can be employed throughout the night. As a rule, these filaments are made to give 1 candle power and 16 candle power, respectively. The change over from one filament to the other is made by turning the lamp in a screw socket. The watts per candle power required by the small filament are much greater than those of the 16 candle power filament. On this account, the life of the small filament is said to be much more than the life of the 16-candle power one.