

A corner of the receiving department, showing the automatic receiving machines and manner in which even the incoming messages are distributed by conveyor

A detail of the conveyor mechanism, making clear the manner in which the belts are able to negotiate a right-angled turn without losing their messages

Twentieth Century Telegraphy

The Big San Francisco Central Office, the Last Word in Equipment for Speed and Capacity

By Charles W. Geiger

WHAT is said to be the best equipped telegraph office in the world was recently placed in operation by the Western Union at San Francisco. Here all the innovations that experience has found to be desirable have been embodied and all features that experience has found to be undesirable have been eliminated. Standardization is now being carried to a point in the design and operation of these telegraph offices seldom seen in any industry.

The San Francisco office, which is the third largest in point of business transacted in the entire United States, handles approximately 2,500,000 messages per month, and due to the modern equipment and efficiency of operation, at least 2,400,000 of these messages are disposed of within ten minutes from the time they are received at the office.

The most striking feature of the new office, aside from the electrical and mechanical improvements, is the comprehensive system of automatic belt carriers which convey the telegrams to and from all parts of the great room. Thus, the greatest economy of time is effected in the handling of messages from the time they are received until they are on the wires.

This system consists of especially designed enclosed belt conveyors in front of every operator, along the center of the tables, conveying all messages entering the room to a central distributing center in a series of flumes.

Messages are received over the multiplex, the Morse, the telephone and by a pneumatic tube system leaving the city branch offices. The messages from these four sources are placed on the belt conveyors, which quickly deliver them to a slower moving belt in front of a line of young women, who sort them and place them on one of the four belt conveyors (according to their destination), to be conveyed to the transmitting operators. The maximum time in transit for messages around the room (which has an area of 10,000 sq. ft.) by means of these conveyors is 54 seconds with an average of 21 seconds.

A very ingenious method has been employed in carrying the conveyors across the main aisle. This is done by double belts, both rising, and clasping the messages between them. This method is also employed in delivering the messages from the telephone room which is located on the floor below the main operating room.

The belt conveyors travel 250 feet per minute, each belt being driven by its individual motor. In order to guard against the delay of a message in passing over these conveyors, two men are employed whose only duty consists in constantly going around the room, stopping each belt in turn for a few seconds, lifting it up, looking under it to see that no message has slipped out of place, testing it to see that it runs freely and then starting it again. As a further precau-

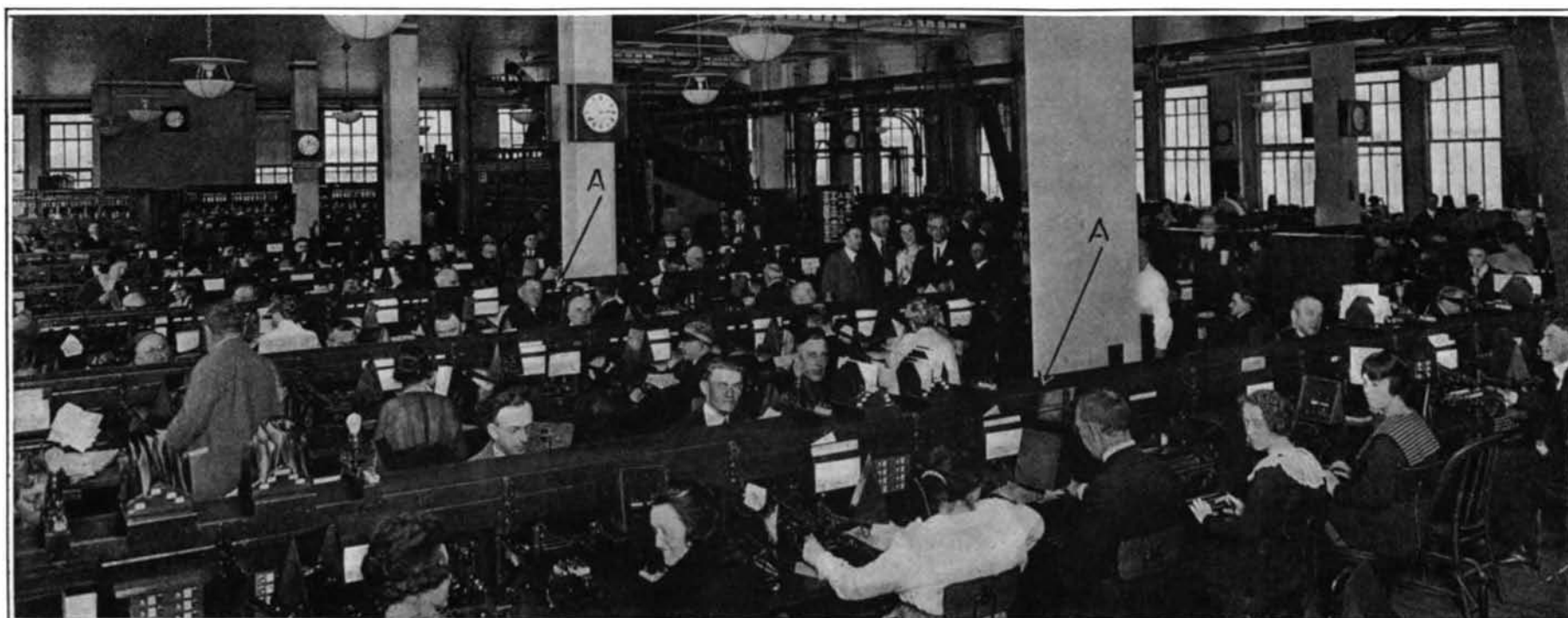
tion, mirrors have been arranged for inspecting the elevated sections of the belt system.

By means of the multiplex, messages are being exchanged between San Francisco and New York within ten minutes every day. The messages are almost literally geared to the inexorable time schedule from the moment they enter the operating room until they have found the proper wires and their transmission has been completed. It is not merely possible but frequent that a telegram is filed at a branch office at San Francisco and received in New York within fifteen minutes. Over shorter distances—say, one thousand miles—the time averages much less, and seven minutes is the average time required for clearing messages to Los Angeles.

It is hardly possible to describe the multiplex system briefly yet satisfactorily. It is based on the idea of an automatic distribution or apportionment of the use of a single wire at intervals, to eight automatic machines, each busily engaged in sending a different message.

The intervals are so rapid that each machine transmits its impulse over the circuit to a corresponding receiving machine, and its turn comes again after the cycle has been completed, in time for it to pick up and send the next impulse without any apparent hesitation. All the impulses are, of course, of equal

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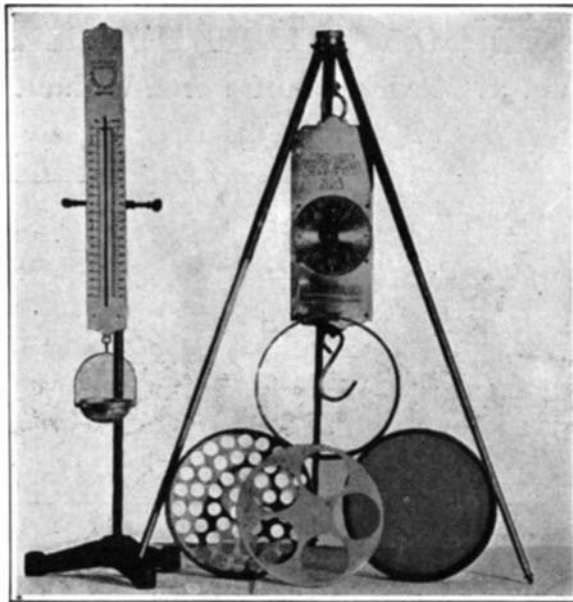
General view of the San Francisco main telegraph office, showing (A, A) the conveyor flumes that carry all incoming messages to the distributing center, and out again to the proper operator

Making Sure of the Concrete Batch

A FIELD equipment for testing crushed stone and sand and clay aggregates, compact, light and capable of withstanding a certain amount of rough usage, has been developed by the United States Bureau of Public Roads, and is proving of great value, both in the plant and in the field or wherever aggregates must be tested for control work in construction and especially in inspection of highway materials.

A factor which probably tends more than any other to discourage adequate control testing of highway materials is the time usually required to send samples to a laboratory for test purposes. Even under the most favorable conditions several days may elapse before a report can be secured, during which time the lot of material represented by the sample must be held. Aggregates always are subject to variations in size, due to inefficiency in plant screenings and other causes, and yet may be intended for use in construction requiring uniformly graded aggregates.

The field equipment consists of a set of interchangeable stone-screens, with screen plates having perforations, 3, 2½, 2, 1½, 1, ¾, ½, and ¼ inches in diameter; a set of interchangeable sand sieves of 10, 20, 30, 40, 50, 80, 100 and 200 mesh; a circular spring scale having a capacity of 30 pounds and sensitive to 0.1 of a pound; a straight spring balance having a capacity of 30 pounds and sensitive to 0.1 of a pound; a straight spring balance having a capacity of 200 grams and sensitive to 1 gram; a demountable cubic-foot box; an ordinary camera-folding tripod; a 250-cubic-centimeter graduate; a strip of screen wire



Apparatus for testing aggregates, recently developed by the U. S. Bureau of Public Roads

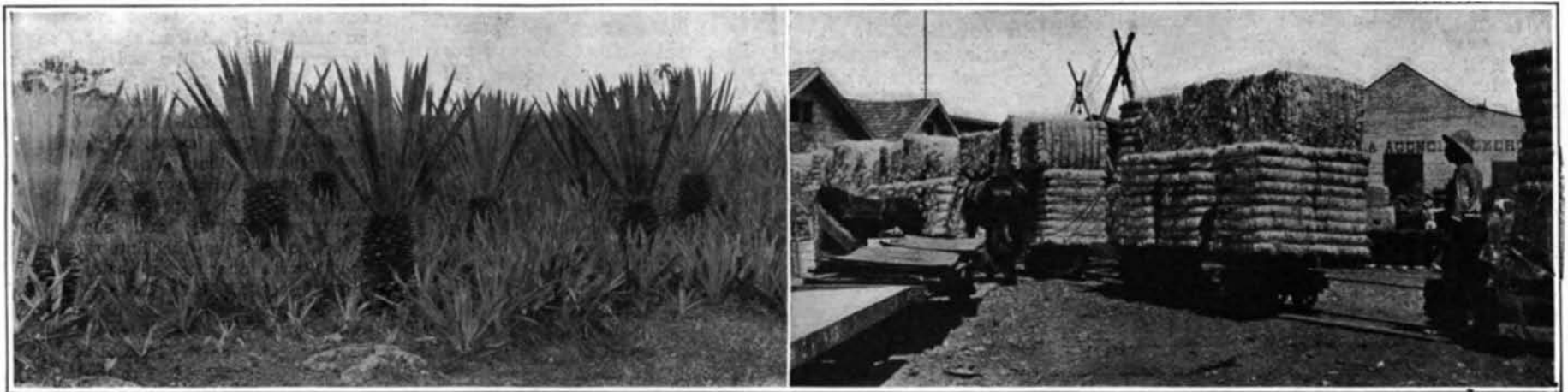
Binder Twine from Florida

WITH more than 200,000,000 pounds of binder twine being used annually to harvest wheat, oats, rye and barley in the United States, a company in Florida has begun the cultivation of sisal and

enterprise, however, is assured a fruition of its plans by 1922. The first crop, necessitating the cultivation of 1,000 acres, was begun in 1917, five years being required to grow the first crop. Southern Florida is the only place in this country where climate and soil are such as to encourage growth of the fiber-producing plants.

Sisal is a tropical plant, the maintenance of which cannot be insured where the temperature falls to the freezing point at any time, 50 degrees being preferable. The lowest temperature in Yucatan is 48 degrees. Among the soil requisites are a porous limestone land, and adequate drainage. For profitable results it should be grown on a plantation of at least 1,000 acres. It is estimated that the first crop in Florida will require a capital of \$100,000 before it is brought to fruition. This computation includes cost of machinery, land and the clearing of the virgin territory. The Florida enterprise has acquired several thousand acres of land, located in the southern portion of the Everglades, in Dale County.

This country is threatened with a shortage of binder twine due to the two-fold factor of a decreased price of the product with the resultant effect of a decreased acreage in Yucatan. There are ten companies in the United States making fiber from the Yucatan-grown plant, one concern alone using annually 40 carloads of fiber. There is no practical method whereby the twine can be recovered once it is used in tying the bundles of grain, a fresh supply being demanded each harvesting season. It is a low-priced crop and cannot be grown on high-priced land, the yield of sisal not exceeding \$100 an acre. American



Left: Thrifty henequen plants cultivated in Cuba. Right: Bales of henequen fiber on their way from warehouses to pier in Yucatan, Mexico

about 22 inches in length and 5 inches high, and two canvas bags about 18 by 18 inches in size.

The interchangeable screen set consists of a number of perforated screen plates 8 inches in diameter, and two brass rings, one of which is provided with a narrow shoulder on the inside upon which a screen plate may be placed. The two rings are firmly clamped together so that the screen plate is held rigidly between them. This forms a screen of the same size and shape as the ordinary laboratory type.

The sand sieves are of the same general type as the screens, the various sieve plates fitting into the brass rings in the same manner. A sieve of any desired mesh may be made up by simply inserting the proper sieve plate in the lower ring and clamping it down by means of the upper ring.

The circular screen scale is supported by the tripod. The graduate is the only piece of glass in the outfit and is needed only when it is desired to make volumetric silt determinations. The circular loop of screen wire is used for making apparent specific gravity determinations of coarse aggregates. The strip is to increase the capacity of the screen, so that it may be used for weighing samples of sufficient size for this determination. It is rolled in the form of a loop and placed inside of the screen ring which in turn is suspended from the spring scales by means of three light wires.

The importance of the proper sampling of material in connection with the testing of aggregates cannot be over-emphasized. There are two points which must be borne in mind when sampling crushed stone and gravel aggregate. First, the sample must be representative of the entire quantity being examined; and second, it must be large enough so that the largest individual piece will in no case weigh more than 2 per cent of the weight of the entire sample.—By R. Franklin Mundorff.

henequen fibers as a source of home supply, the product heretofore being imported from Yucatan. The American farmer expends approximately \$20,000,000 for the twine used in tying into bundles about 100,000,000 acres of small grain yearly.

Previous attempts to grow binder-twine fiber in the United States have been unsuccessful. The Florida

hemp as a substitute is too valuable and is not otherwise altogether satisfactory.

About 2½ pounds of twine is used for each acre of grain, with the exception of corn, which requirement is in excess of these figures.—By S. R. Winters.

Putting the Street Lamps into Niches

THE huge Kensico Dam at Valhalla, N. Y., which forms part of the Catskill water supply system of New York City, is crowned by a broad roadway which is used by pedestrians and vehicular traffic alike in crossing the broad valley at that point. Hence one of the problems confronting the designer of the dam was the installation of some suitable lighting system for the roadway. At first the usual lamp post idea was suggested, of course using suitable lamp posts in keeping with the general appearance of the masonry construction. But on second thought it was decided that lamp posts of any sort would detract from the appearance of the dam, with its impressive flat top unmarred by any projections.

The final system of illumination adopted and installed on the Kensico Dam roadway consists of a large number of niches in the parapet walls, each containing a high power nitrogen-filled incandescent lamp behind a sheet of prismatic glass. A near view of one of these lighting units is shown in the accompanying illustration, which depicts how the prismatic glass and lamp are protected by a grillwork. The unit may be opened for inspection, cleaning, and the renewal of the bulb by opening the padlock. These units, placed at intervals of about fifteen feet, first on one side and then on the other side of the roadway, spread out their rays so that they virtually overlap, thus forming one sheet of light from one end to the other of the dam roadway. The effect is most pleasing, since the light is kept near the surface where it is needed, unlike the usual system of lighting.



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Lighting unit installed a foot above the sidewalk along parapet roadway of Kensico Dam