AN ELECTRO-MECHANICAL COIN COUNTING AND WRAPPING MACHINE.

BY A. FREDERICK COLLINS.

Of the many labor-saving devices introduced into banking and business methods in recent years certainly not one of them is more successful in reducing to a minimum the amount of work involved than the coin counting and wrapping machine. Where a large number of coins have to be counted and wrapped by hand those who do the work must be highly skilled or there will be numerous errors, and this is especially true when the operators become fatigued. The machine illustrated in connection with this article was constructed by Edward Van Winkle, an electrical engineer, of New York city, and the speed and accuracy with which it counts and wraps coins is a matter of no little surprise to one who sees it in action for the first time.

A conception of what the machine can do can perhaps best be conveyed by comparing it with hand labor. The most proficient manual expert can count and wrap without error not more than one package of coins per minute, while the machine will wrap from eight to twelve packages per minute, depending upon the size of the coins. It is evident, therefore, that the machine will duplicate the work of eight or twelve persons, with the added advantage of absolute accuracy.

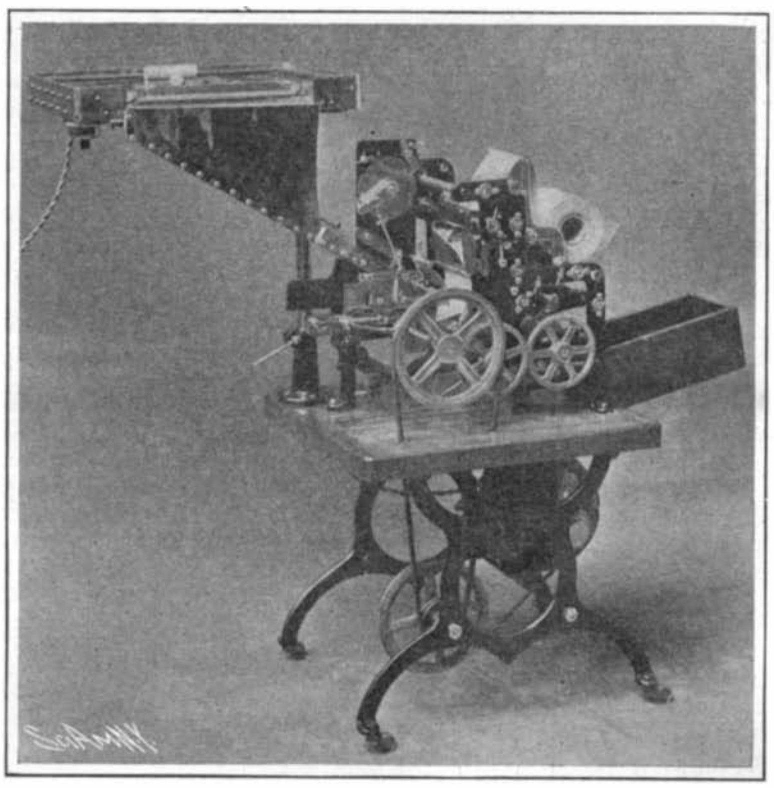
The machine, which is driven by an electric motor, is as nearly automatic as human ingenuity can make it, and its speed is limited only by the ability of the operator to scrutinize the coins and feed them into a hopper, and actual working tests have shown that at least three hundred coins can be looked over, and bad ones eliminated, every minute by a fairly rapid operator. A reference to the illustration will enable the reader to form a good general idea of how the money is counted and then wrapped, not by electricity exactly, but rather by a mechanism driven by an electric motor.

Flush with the top of the elongated hopper is a small table and on this the coins are placed. The operator spreads them out so that they may be quickly observed, individually and collectively, and in case there are any mutilated or counterfeit pieces among them they can be thrown out. This preliminary work accomplished they are merely pushed into the hopper and left to the machine to do the rest. From the hopper they are conducted by and through a conduit to a reciprocating push-bar, and here, regardless of thickness and diameter, they are brought together in a row preparatory to being wrapped. When the number of coins required to make a bundle, of say twenty half-dollars, are brought forward the last one registers the fact, and also sets the wrapping mechanism, inactive until now, into operation.

The coins, now counted and bunched, are carried by means of a holder from the buncher to the wrapper, the holder returning to its first position into which the coins are deposited ready for the next package. While the coins are thus being carried to the device which rolls them into packages the holder picks up and takes with it the end of the paper to be used in wrapping and which has been conveniently left behind by the package wrapped before it. At the same instant with this action the lower coin roll is thrown out of its normal position forming in consequence a recess or pocket with the two upper rolls, and into this the row or bunch of coins is transferred.

The roll returning to its first position, it, with the others, begins to revolve and the band of wrapping paper is drawn by friction around the bundle of coins, between it and the rolls, by the motion of the latter. Making two complete revolutions, the paper is wound tightly around the coins twice and projecting beyond them allows enough for the crimp. When the paper has been wrapped around the coins a V-shaped knife severs it from the roll of paper.

The final process consists of crimping the edges of the package, and this is done by turning them inwardly by the crimpers, these drawing the converging edges of the paper, made by the knife, in opposite directions, the result being a clean, smooth and mechanically perfect package in which neither paste nor glue is required as a fastener. Since all coins are not of the same thickness, naturally the length of the package varies for different coins; but whatever may be the length, the crimpers force the edges of the paper up tightly to the surface of the coins. When the crimping is completed the package resembles somewhat a cartridge, when it is ejected from the machine into a box, which may then be detached and carried wherever the packages of coin may be needed. One of the clever features about the machine-made wrapper is that, like a good safe, it is burglar-proof; that is to say, it is quite impossible to break into it and extract a coin without completely destroying the paper case in which it is wrapped. As the ends of the package are not sealed, it is unnecessary to write or print on the wrapper the value of the coin inside, as the denomination can be readily seen; if, however, such markings should be desired the roll of paper can be printed before it is put into the machine. The longest wrapper measures 7¾ inches long by 2⅜ inches wide, while the shortest wrapper is 4⅛ inches long by 2⅞ inches wide. The long wrappers are adapted to twenty-five-cent pieces, and the short ones to fifty-cent pieces. It is pointed out that the economy of paper can only be realized when one attempts to wrap the coins by hand in a wrapper that has been cut off by the machine.



AN ELECTRO-MECHANICAL COIN COUNTING AND WRAPPING MACHINE.

While Mr. Van Winkle designed and constructed the machine described, he was not the inventor, but developed it for one of his clients. He gives us this excellent version of its origin: "The inventor of the device had been connected with a 'penny-in-the-slot' machine company and was dependent for his living upon returns from several of these vending machines; his revenue was all in coin and he came to dislike the sight of it. He had three nail kegs in his room in which he deposited his daily collections, and if perchance he wanted to pay some bill by check he and all his family would have to stay up all night counting and wrapping these coins so that he could deposit them in the bank. His wife suggested in fun one evening, while his family were industriously wrapping in order to swell his bank account sufficiently to pay his rent, that he invent a way to count the coin by machinery and thus save the tedious hand labor."

Acting upon this suggestion he invented a machine, patented it and then built it, only to find on completion that it would not do the work commercially as it should. His general idea was good but the mechanical movements he utilized in developing it were not the proper ones. Instead of the three rotary rolls as now employed he used a loose belt to form a pocket; instead of crimping the ends he used glue to fasten the package, and finally instead of feeding the paper from below he fed it from above. Under more scientific treatment, however, all the defects were eliminated and a perfect coin counter and wrapper resulted. Thus a machine of great value has been brought about in one that otherwise would have ended in flat failure, and all due to simple but necessary changes.

The electric motor for running the new machine consumes but three-tenths of an ampere at 110 volts and connection is easily made by means of a light socket and a plug. A turn of a button switch starts or stops it as desired.

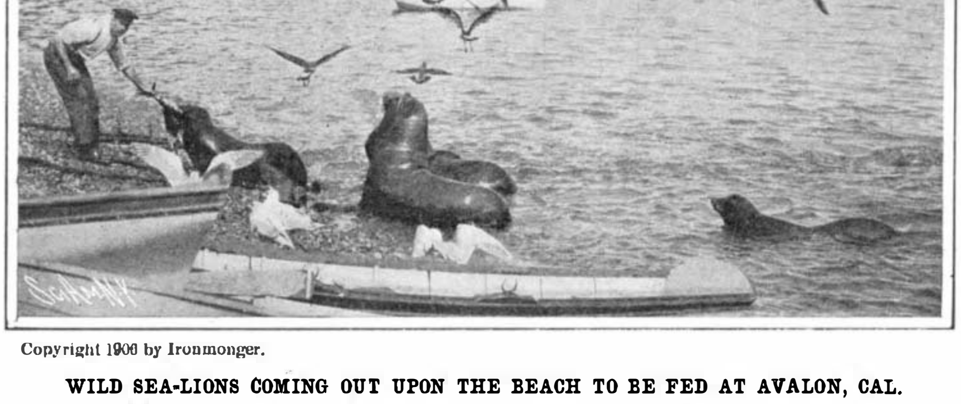
THE TAMENESS OF WILD ANIMALS.

BY CHARLES FREDERICK HOLDER.

That wild animals become extremely tame is well known. The wild quail of Southern California will enter gardens, and nest there; and in the protected season I have seen a flock standing in a country road, a jaunty male between them and my horse, not twenty feet away; moving only when I moved, and then with reluctance. Several years ago some residents on one of the channel islands of Southern California introduced a number of black-tailed deer which were protected to such extent that in time they discovered that they were privileged characters, and assumed nearly the absolute contempt for human beings held by the sacred bulls of India, that crowd men and women from the road. They persisted in entering gardens, day and night, destroying the plants, and finally to locate them the dwellers on the island had bells fastened to them. One buck made his home near the town of Cabrillo and walked about the place and over the hills with the freedom of a dog. When a boat landed off the pier the buck ran down to greet the newcomers and share their lunch, and became a welcome guest at barbecues and lobster and clam bakes. As time went on this deer through attention became extremely arrogant and began to resent any lack of attention; in a word, like many persons, he could not stand prosperity; and one day when an old lady refused to allow him to eat her lunch, the buck drew off and bowled the lady over. This seemed to open up a new field of pleasure to the deer (and women particularly appeared to be the object of his enmity), which at last became so pronounced that the animal had to be placed in confinement. Nearly all animal life is protected at this island. I have counted half a hundred bald eagles in an eleven-mile run; have seen them take a large fish from the water within easy gunshot, and they build their nests on pinnacles that are not difficult of approach. The sea birds are equally tame. Gulls gather in flocks a few feet from those who feed them; in the winter flocks of cormorants swim into the bays and are so tame that they merely divide when a boat passes, and fishermen often find that the cormorants take off bait almost as fast as they can put it on. Gulls dash at bait, and I have seen a long-winged, petrel-like bird follow my line under water at a cast, using its wings to fly along, and take the bait; and at times scores of sea birds are seen inshore feeding upon small shrimps, paying no attention to observers photographing them.

The most remarkable illustration of tameness to be seen here is that of the sea-lions, the story of which is so graphically told in the accompanying photograph. For ages the animals have held possession of a mass of rock on the shore of the island. A few years ago many were killed by vandals, but laws were passed and for a number of years the sea-lions have been protected and the rookery has increased in size until a split has recently occurred and another settlement

(*Continued on page* 8.)



WILD SEA-LIONS COMING OUT UPON THE BEACH TO BE FED AT AVALON, CAL.

diameter. On one end of the latter shaft is placed the large gear wheel which meshes with the pinion. The front propeller works at the rate of 260 R. P. M., while the smaller one runs at 280 revolutions. By running both propellers at the same time we obtain a total of 85 horse-power for the airship. As it is not desired to travel faster than about 15 miles an hour the large propeller alone will generally suffice. With both motors the speed will be 20 miles an hour. Steel-tube framing covered with stout canvas is used for both propellers. The diameters are 18 and 15 feet respectively.

Next to the rear motor is mounted a small five-horse-power motor of the Werner two-cylinder motocycle type. It is used for driving the air blower which fills out the inside air-bag, or balonette, contained in the balloon.

At the rear end of the balloon is a vertical rudder, and a horizontal frame runs under the balloon for some distance in order to steady it. On the nacelle is placed a 20-gallon gasoline tank of flat form and a 10-gallon water tank. The main gasoline supply is carried in a set of long cylinders. Under the nacelle will be hung a large, flat basket or car which will hold all the supplies and provisions. One of the features is an automobile sled which contains provisions for 75 days, and is designed to run on the ice by means of a cylindrical roller provided with points.

By the time this article appears, the material will have already been packed up and sent to Spitzbergen, and Mr. Wellman, along with his aids, will have arrived on the spot, where Major Hersey has been erecting a great balloon shed along with annex buildings, a meteorological station, and a hydrogen plant.

THE TAMENESS OF WILD ANIMALS.

(*Continued from page 6.*)

has been established half way up the island. It has been the custom for years for fishermen in cleaning their fish to toss the refuse into the bay, and the sea-lions formed the habit of coming down to the bay at this time to dine thereupon. At first only one or two came; now a band of two large bulls and several females make their headquarters at the bay, or spend most of the time there, constituting a valuable sanitary corps, as they eat every fragment of fish, the gulls joining in the feast. When not feeding, the sea-lions pass the time lying within a few feet of the beach, sleeping or playing, the females and young leaping from the water and going through various tricks of interest to the looker-on.

But a few feet away from the sea-lions are the boat-stands of the fishermen and boatmen, and boats are moving out and over the sea-lions constantly; yet they are apparently oblivious to the men, who never molest them. This has had a peculiar result. The enormous animals have become so tame that they almost allow the men to touch them, and readily come out upon the shore to feed from their hands. It so happened that I was upon the sands when no sea-lions were in sight, and upon asking a boatman where they were, he began to whistle, as though calling for a dog, and to call, "Here, Ben!" repeating the call several times, whereupon out from among the anchored boats appeared not only Ben, but two large bull sea-lions, which must have weighed half a ton, followed by two or three smaller females. The boatman tossed some pieces of albacore into the water, which the sea-lions dashed for, and down upon their heads plunged several score of gulls, paying not the slightest attention to the huge animals cavorting about. The sea-lions seized the dead fish under water, brought it to the surface and with a violent swing back and forth, tore the fish in pieces, the birds taking the debris, while several large pelicans floated in the immediate vicinity ready to pounce upon any fragment that came their way. Not ten feet from this interesting scene floated several boats containing spectators, yet the wild animals paid no attention to them, affording a remarkable illustration of the tameness of animals when protected. When this fish was disposed of the boatman took a large albacore by the tail and walked down the beach, calling the sea-lion by name. The animal responded at once, coming inshore with a rush, followed by two others. The boatman gradually retreated up the beach, the huge animals following, in their clumsy waddle, resembling gigantic slugs more than anything else, finally taking the fish from the man's hands. The scene was so remarkable, the confidence in the man so complete, that I requested a local photographer, Charles Ironmonger, to photograph the group, and the accompanying illustration is the result, showing a dramatic situation that occurs daily at Avalon Bay on the main street of the little town, affording a free show to visitors and sojourners on the island. The rookery where the animals make their headquarters is about two miles distant, and the sea-lions are so tame here that they can be approached with ease, and are the constant objects of amateur photographers who visit the locality in yachts and boats of various kinds.

THE PETERBOROUGH LIFT-LOCK OF THE TRENT VALLEY CANAL.

For many years great interest, particularly in Canada, has attended the construction of the Trent Valley canal project, to join Georgian Bay with Lake Ontario by means of a waterway, partly artificial, partly using natural watercourses, across the Province of Ontario. By means of this canal the long detour through Lakes Huron, St. Claire, and Erie is avoided, and the distance from the upper lakes to the eastern end of Lake Ontario is shortened by about 250 miles. In the total distance of 203 miles there are only about 20 miles of actual canal, the remaining portion of the waterway being through lakes and river stretches rendered navigable by dredging or by building dams. It is intended that the waterway shall have an ultimate depth of 8 feet, though at present the depth is but 6 feet. The configuration of the territory through which the waterway runs necessitates thirteen locks of the ordinary type, 134 feet by 33 feet, and three hydraulic lifts. Two of the latter are as yet but partially completed, though the third, near the town of Peterborough, has recently been opened to traffic. The construction of the Peterborough lift is of interest for various reasons; primarily, because it is the largest structure of this character in existence, and because concrete has been almost exclusively used in building it.

All the more recent structures on the Trent Valley are of concrete, and this material has been used wherever possible, in high-level bridges, swinging bridges, dams, culverts, and locks. The waterway is a barge canal, and when the 8-foot depth has been reached vessels of 800 tons burden may be used. The time for a tow to reach Montreal from Georgian Bay is estimated at six and a half days, employing steam barges as tow-boats as well as freight carriers. The entire cost of the canal when completed will be under $10,000,000.

The hydraulic lift-lock at Peterborough is on a four-mile section of the canal, and overcomes an elevation of 65 feet in a distance of 800 feet. The hydraulic lift-lock is theoretically automatic in principle, and is of great value where considerable differences of elevation are found in comparatively short distances, or where water available for canal use is scarce. The lift is operated on the principle that as a loaded vessel descends in one chamber of the lock, an empty one ascends in the other chamber, an additional volume of water in the lifted chamber being raised to the upper reach as the difference between the weights. A novel feature of value in the lift-lock is that it is double, permitting two vessels to be locked up and down respectively at the same time.

The Peterborough lock, as in other similar structures, consists essentially of a pair of watertight steel boxes, or chambers, carried by heavy trusses which are supported by two rams, each of which works in a steel press under each chamber. In the present instance the rams are 7 feet 6 inches in diameter, and the presses are connected by a 12-inch pipe, provided with a regulating valve governing the flow of water from one press to the other. The chambers are provided with swinging doors at each end, hinged at the lower edge and swinging outwardly, to permit the ingress or egress of the vessels raised or lowered. The gate construction of the Peterborough lock is a departure from the usual form of sliding gate heretofore employed, and is said to be a distinct improvement over the older form. By means of the lift-lock the operation is materially shortened, as it takes but three minutes to raise or lower the lock chambers, and from twelve to fifteen minutes to pass one or two vessels through the lock. As a further precaution, a hydraulically-operated gate is placed on the upstream of the lock.

The lock is built upon a mixture of hard clay, stone, and bowlders overlying a limestone rock, which forms the foundation for the substructure, built wholly of concrete. This substructure includes the main or breast wall, the wings, the side walls, and three towers, as well as the walls which terminate the lower reach. The main wall serves as a retaining wall for the upper reach, while the wings serve to hold the side embankments. The structure has been carried out in pleasing architectural effect by means of moldings and pilasters formed in the concrete.

The towers are approximately 100 feet high from the rock, and some 30 x 40 feet at the base. These towers contain the guides for the chambers, and the central one has, on its top, the cabin from which the lock operator controls the mechanism. The main wall is 126 feet long at the base, 80 feet in height, and 40 feet thick. It is pierced by a roadway, and thereby obviates the necessity of a swinging bridge. In the main wall, too, is a chamber in which the turbines and pumps are installed. The chamber pits are kept dry by the side walls which, as mentioned above, form the retaining walls for the earth alongside the waterways. The pits under the chambers are separated by a 12-foot wall.

The lock chambers are of large size, having clear inside dimensions of 139 x 33 feet, with a height of 9 feet 10 inches. The trusses which carry the chambers are of the double cantilever style, while four plate girders 9 feet in depth bring the load directly on the top of the ram columns. Each chamber weighs 800 tons empty, and 1,700 tons when filled with water. The pressure on the rams is nearly 600 pounds to the square inch. The rams are hollow and of cast iron, about 3¾ inches thick. The presses in which the rams work are steel castings having an internal diameter of 92½ inches and 3½ inches thick, the space between the rams and the presses being 1¼ inches. Each press was tested to a pressure of 2,000 pounds to the square inch; and the stuffing box at the top, filled to a depth of 9 inches with braided hemp held in place by a steel gland, does not leak under a pressure of 1,200 pounds to the square inch. The press wells are 18 feet deep, 16 feet 6 inches in diameter, lined with concrete to a finished depth of 14 feet 2 inches. To take the heavy load at the bottom of the presses, estimated at 2,000 tons, large blocks of granite were employed as foundations.

The lock is operated by placing the lower chamber with its bottom level with the bottom of the canal, thus allowing it to contain an 8-foot depth of water, while the bottom of the upper chamber is 10 inches lower than the bottom of the canal above, and thus contains water to a depth of 8 feet 10 inches. This gives the upper chamber an approximate weight 100 tons greater than the lower one. When the vessel has entered the lower one, the gates are closed and the valve of the connecting pipe is opened. The extra weight in the upper chamber causes that chamber to descend, forcing the water from the press below it into the other press, and causing the other chamber to rise with the rams that bear it. The weights of each chamber will be the same, whether merely filled with water or bearing a vessel, for, as is well known, a floating body displaces exactly its own weight of the liquid.

It is, of course, necessary to form a watertight joint between the end of the chamber and the end of the reach of the canal, the distance between the two being a little less than 2 inches. The joint is accomplished by means of a rubber hose fastened to the face of the reach along the sides and bottom, which is inflated with compressed air. The tube is flat and lies along the frame of the gate, and requires little air pressure to make a tight joint. Large rubber strips are employed within the chambers to prevent water leakage along the rims, the edges of the gates being machined to true surfaces which press against the rubber strips.

Various devices, including pumps and an accumulator having a ram, are used to remove casual water in the lock chambers and to supply water losses arising from the operation of the lock. Certain of the pumps are operated by turbines working under a 65-foot head in a chamber in the substructure.

The Death of George J. Snelus.

George J. Snelus, the metallurgist, vice-president of the Iron and Steel Institute, died on June 20 at the age of 69 at his residence, Ennerdale Hall, Fritzington, Cumberland.

The family of George James Snelus was impoverished when he was but seven years old, but the mother succeeded in giving the boy a good education and he was trained for a teacher at St. John's College, Battersea. After teaching several years he studied sciences at Queen's College, Manchester, and the Royal School of Mines, for which he gained a free scholarship. At the latter he had a brilliant career, carrying off medals and scholarships, and upon graduation securing appointment as chief chemist at the Dowlais Works, a post he filled for four years and a half. In 1871 he was made a member of the scientific commission sent to the United States to investigate steel-making processes, and on his return to England he announced the discovery of a process which enabled the making of pure steel from impure iron in a Bessemer converter lined with basic materials. This discovery of the basic steel process gained him the gold medal of the Iron and Steel Institute in 1883 and revolutionized the steel-making industry, as phosphoric iron, theretofore useless in steel making, could be used. His processes are employed in all countries.

A large roundhouse, with locomotive drop-pits of novel design, and equipped with an overhead traveling crane, has been built in connection with two new yards of the Pennsylvania Railroad at East Altoona, Pa. The roundhouse is a complete circle 395 feet in diameter, with fifty-two stalls 90 feet deep, and is served by a turntable 100 feet in diameter. The main portion is 65 feet wide, with a 60-foot 12½-ton crane, while parallel with this is a lean-to span in which the smoke outlets are placed. There are four drop-pits, one large enough to take all driving wheels at once, two for single pairs of driving wheels, and one for truck wheels. The table of each pit is operated by vertical screws working in nuts revolved by worm-wheel gearing, the screws descending into iron pipe sunk below the floor of the pit.