AN AUTOMOBILE FOR RURAL FREE DELIVERY.

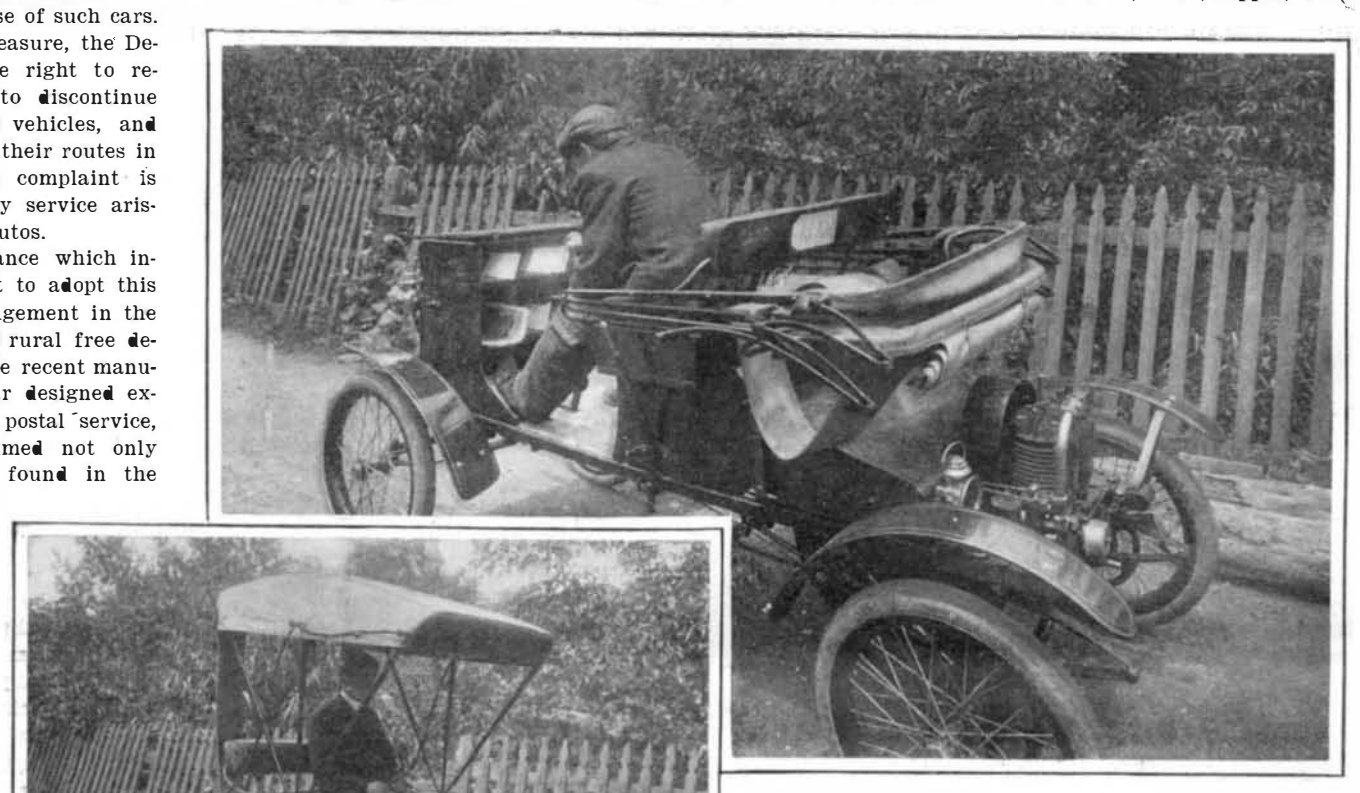
BY WALDON FAWCETT.

For several years past rural mail carriers in New England and certain other sections of the country which are favored with exceptionally good roads have employed automobiles in making postal deliveries and collections in country districts. A number of factors, however, operated against a general sanction by the Post Office Department for the use of the horseless vehicles by rural postmen as a class. These influences included the varying conditions of the roads in many parts of the United States; physical aspects of the country; unbridged streams; defective mechanism in the construction of some of the automobiles offered for such service, and ignorance on the part of many rural carriers in regard to the operation of the motor cars. Of late, however, conditions have appeared to be ripe for a much more general utilization of automobiles in this branch of the postal service, and action has been taken accordingly.

Upon the recommendation of Fourth Assistant Postmaster-General De Graw, who has general jurisdiction over rural free delivery, Postmaster-General Cortelyou has issued an order sanctioning the use of automobiles and motor cycles where the roads are maintained in good condition and the physical aspects of the country are favorable to the use of such cars. As a precautionary measure, the Department reserves the right to require rural carriers to discontinue the use of horseless vehicles, and resume the service of their routes in ordinary vehicles, if complaint is made of unsatisfactory service arising from the use of autos.

The chief circumstance which induced the government to adopt this new policy of encouragement in the use of automobiles in rural free delivery was found in the recent manufacture of a motor car designed expressly for the rural postal service, and which it is claimed not only remedies the defects found in the earlier motor cars tested in connection with rural mail carrying, but can also be furnished to country postmen at a price in the neighborhood of $400 each, or little more than the average country postman might be called upon to expend for a team of horses and a vehicle, with which to traverse his route under the old conditions.

The new automobile during the past few weeks has been subjected to the best of all tests — practical service on various rural mail routes in the States of Virginia and Maryland. These demonstrations will be repeated some six months hence, in order that the government officials may have an opportunity to observe the behavior of the vehicle on roads choked with snow and in the face of winter conditions in general.



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New Automobile for Rural Free Delivery, Now Undergoing Government Tests.

AN AUTOMOBILE FOR RURAL FREE DELIVERY.

This unique postal motor car is an Orient friction-drive buckboard, with a seating capacity of two persons. It is fitted with a mackintosh buggy top, and on the forward part of the body is mounted a case divided into pigeon-hole compartments for holding the mail. The weight of the car is 600 pounds, and with a carrier and the maximum quantity of mail matter to be transported on any trip, the gross weight would probably be considerably less than 900 pounds. The maximum speed of the car is 25 miles, and the normal speed on ordinary roads is 15 to 18 miles per hour. The manufacturers claim that the hill-climbing power of this type of car exceeds that of any other motor car, regardless of horse-power or weight, and in actual tests machines of this design have ascended grades of 32 per cent.

The propulsive power is furnished by a single-cylinder, air-cooled motor of four horse-power. A three-blade fiber fan mounted on the front of the cylinder assists in the air-cooling properties. The motor consumes about one gallon of gasoline per thirty-five miles, and the capacity of the gasoline tank is three and one-half gallons. The average length of a rural free delivery route is twenty-four miles, and the introduction of an automobile on any route, with its consequent saving of time, makes necessary an entire rearrangement of the carrier's schedule.

Seasickness and Equilibration of the Eyes.

Many people have no doubt noticed, when traveling by sea, that the motion of the ship could be *seen* very distinctly, even when there were no hanging lamps, draperies, or fixed points, such as the horizon or clouds, within range of sight.

Some may think that seeing the motion in this way is due to the imagination receiving its suggestions from the motion of the internal organs, and especially the stomach, for I am here supposing the body to be held perfectly rigid.

From observations which I have recently made it seems evident to me that the cause for seeing the motion is entirely different.

In the first place, you can always see the motion a fraction of a second before you begin to feel it. In the second place, you cannot see a perfectly horizontal motion or a gentle vertical (heaving) motion. In the third place, watching a fixed point close to you, such as a pattern on a carpet, when the ship is pitching and rolling, is far more tiring to the eyesight than when the ship is motionless or running perfectly steadily. All this points to the appearance being due to a true relative motion of the eyes to the ship.

The eyes are suspended in their muscular settings, much in the same way as are ships' compasses in their binnacles. The eyes are, furthermore, perfectly balanced, so as to make their muscular displacements as little tiring as possible. In their normal position, the pull of gravity is exerted vertically through their centers, and the muscular mechanism is compensated for gravity.

Any angular change of position will displace the eyes just as it displaces the stomach, excepting that the eyes, being a great deal more sensitively suspended, will register the displacements more quickly. It is not, however, the motion of the eyes which strains the eyesight, but the act of resisting this motion.

If, with your eyes shut, you attempt to fix the mental representation of a point, which a moment previously you were watching with eyes wide open, you will find that, after one or two motions of the ship, the bodily feeling will precede any visual sensation which your imagination can conjure up. The imaginary point is no longer fixed, but follows the eyes as they let themselves go to the motions of the ship. No strain of the eyesight is caused by a muscular resistance, and the displacements, while felt, can no longer be seen.—Alfred Sang in Nature.

The deepest colliery shaft in Germany at the present time is the No. 3 shaft of the Morgenstern Colliery at Zwickau, which is 1,082 meters deep.

A MECHANICAL ELECTRO-PLATING APPARATUS.

BY A. FREDERICK COLLINS.

It is well known that before articles can be electroplated they must be cleaned, both mechanically and chemically. Prior to the invention of the arrangement here described and illustrated, it has been the practice to place the articles in a jar or sink, or to string them on wires, when they are carried through a concentrated solution of lye, then cyanide and water, or a mixture of suitable acids, as the case may be, and then transferred to an ordinary plating tank.

The cost of plating small articles by this method was not only excessive, but the work done was far from good. These features led to the employment of plating barrels. The merits of plating barrels were not to be ignored, whatever their disadvantages might be; for by their use much time was saved. It was therefore unfortunate that the plating barrel had, in almost every case, to be abandoned, owing to imperfections.

In the Hanson & Van Winkle mechanical electroplating apparatus these defects have been eliminated, marked improvements made, and a machine evolved that is commercially perfect. Batches of the very smallest articles, such as screws or pins, or of pieces as large as stove legs and pulley wheels, may be plated with nickel, brass, copper, or zinc, entirely doing away with the handling, labor, and cost of wire formerly used in stringing.

Briefly, the apparatus consists of a plating bath in which a cylindrical or other shaped barrel made of wickerwork or any suitable material, is completely submerged. In this barrel is then placed the work to be plated, making contact with the cathode terminals, which are suspended from the conducting shaft inside the barrel by means of short sections of chains. The barrel is revolved by a pulley outside of the tank, and while the deposition of the metal on the articles is taking place, the latter are tumbled about, until by the time the work is completed, they have taken on a comparatively bright polish.

In one of the earlier forms of the apparatus, the perforated barrel submerged in the electrolytic bath was rotated by a belted pulley immersed in the solution. Another trouble arose from the metal that was deposited upon the framework and other metal parts in the solution; a third fault was the inconvenience of getting the barrel in and out of the solution.

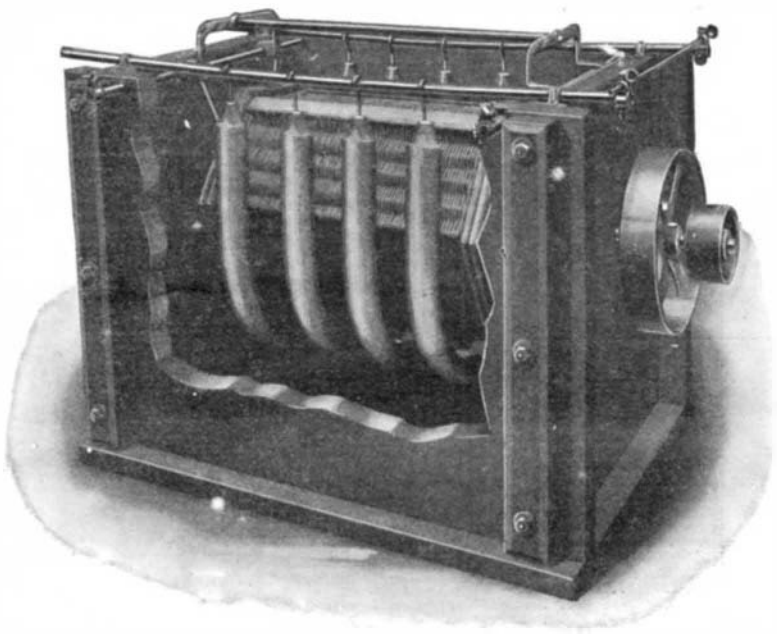
In the new form of apparatus the working parts have been greatly simplified, and the exposed surfaces reduced to a minimum. This has been done by placing the pulleys outside the tank, the shaft passing through one end of the latter, while the metal portions sustaining and rotating the barrel are covered with hard rubber.

The general arrangement of this electro-mechanical plater is shown in perspective in one of the illustrations, with the side cut away, so that the details of construction are more clearly brought out. The barrels are of various sizes, and are made cylindrical, hexagonal, or octagonal, and of wickerwork, wood, hard rubber, celluloid, etc., according to the character of the work to be plated. It is possible to handle pins, shoe nails, and other small pointed articles by using a barrel with sufficiently small perforations to retain them.

Though the drive is from the outside, which avoids the use of belts running in the solution, yet the plating barrel is removable at any time without throwing off the belt, or in any way interfering with the drive. This is accomplished through the medium of a feather and clutch just inside the tank; that is, the end of the pulley shaft is slotted, and the end of the shaft to which the basket is attached slips into it, so that when they are thus joined together both revolve, yet permitting the basket or barrel to be lifted out of the solution, and replaced easily and quickly.

The electrical contacts between the terminals of the dynamo or other source of current and the cathode terminals are large and ample, the current to the shaft

or work-rod carrying the flexible cathode contacts being made through the hangers and shaft connections. For exceedingly light work, celluloid punctured full of small holes is used for the sides of the barrel. For medium-sized work, wicker barrels or baskets are gen-



General View of Plating Vat with Side Cut Away, Showing Rotating Cathode Element and Elliptical Anode.

erally used, and these are cylindrical in shape if the articles require a heavy deposit which must stand extra buffing or polishing, but where it is desired to impart a preliminary polish to the articles to be plated, the baskets are octagonal in shape. For heavy work, such as stove parts or other individual pieces of large cross section and considerable weight, barrels of wood are used. Some of the larger outfits have a capacity of 500 pounds of work per batch.

There is not a solution except gold which has not been successfully worked with these electro-mechanical plating devices, and there seems to be no valid reason why, for small articles requiring a coloring coat of gold, an apparatus of this kind could not be used. Galvanizing small articles, such as nuts, bolts, washers, etc., that require a protecting coat of zinc, is done exceptionally well.

The barrel dimensions are 4 inches by 24 inches. The capacity is 50 to 70 pounds, according to the individual weight of the pieces, but the outfits are made in all sizes up to barrels 2 feet in diameter and 48 inches long, the latter having a capacity of about 500 pounds.

With the advances made in nickel plating during the past few years, the tendency has been to use larger containers, which naturally require anodes of increased dimensions. To meet this condition properly, various schemes have been tried, one of these being the crowding of a large number of plates into the tanks or using irregular shapes, sometimes with cumbersome attachments.

These experiments have led to the use of anodes having elliptical cross sections, and as a further improvement these are curved at the free ends, as shown in one of the illustrations. These curved elliptical anodes virtually surround the barrel or basket, and hence are equidistant at all times from the work, while their peculiar shape and relatively small cross section permit a much more even distribution of the metal and a better circulation of the solution.

It has been demonstrated beyond question that with a wide anode, say 5 inches or more, a corresponding cathode or piece of work that is in the process of plating will receive a much less deposit opposite the center of the anode than at its edges. This has been absolutely confirmed by a careful micrometric measurement of the deposit. By the use of the new elliptical anode, which is not over 2½ inches wide and of sufficient thickness to cause an equal distribution of the metal in every direction, all of the surface required is readily obtainable, and a full and complete circulation is also effected around each plate.

With the apparatus under consideration, two speeds are provided, the high speed being used where the articles to be plated are without sharp edges and can be tumbled very rapidly when a preliminary finish is imparted. With a great many articles it is unnecessary to buff them. This method of plating should commend itself to progressive manufacturers, since its merit as a labor saver has been conclusively demonstrated.

Halley and His Comet.

When a young man of twenty-one Halley left England for St. Helena, and there, in the years 1676-1678, he laid the foundations of stellar astronomy for the Southern Hemisphere; moreover, in the course of his work he there succeeded in securing the first complete observation of a transit of Mercury. After his return to England, the next few years of his life were spent in laying science under a special debt that can hardly be over-appreciated. He placed himself in personal relation with Newton, propounded to him questions and offered information; and it is now a commonplace statement that Halley's questions and suggestions caused Newton to write the "Principia." More than this, we know that Newton's great treatise saw the light only through Halley's persuasive insistence, through his unwearying diligence in saving Newton all cares and trouble and even pecuniary expense, and through his absolutely self-sacrificing devotion to what he made an unwavering duty at that epoch in his life. Again, he appears to have been the first organizer of a scientific expedition, as distinct from a journey of discovery, toward the Southern Seas; he sailed as far as the fifty-second degree of southern latitude, devised the principle of the sextant in the course of his voyaging, and, as a result of the voyage, he produced a General Chart of the Atlantic Ocean, with special reference to the deviation of the compass. Original, touched with genius, cheery of soul, strenuous in thought and generous by nature, he spent his life in a continuously productive devotion to astronomical science, from boyhood to a span of years far beyond that which satisfied the Psalmist's broodings.

New Method of Pouring Small Objects in Rotating Element Prior to Plating.

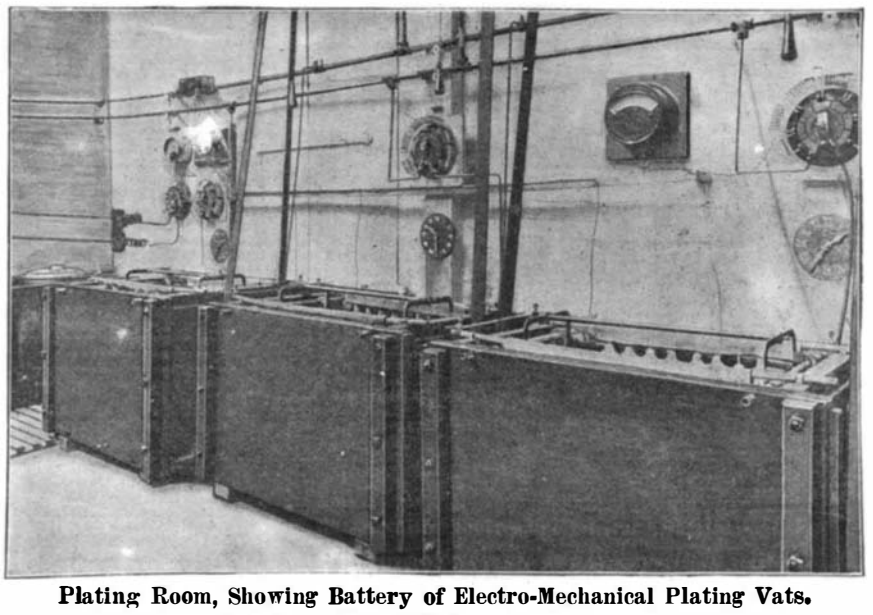
Halley's close concern with Newton's "Principia" made him the Mahomet of the new dispensation of the astronomical universe, and he was prepared to view all its phenomena in the light of that dispensation. A comet had appeared in 1682—it was still the age when

Old Method of Stringing Small Objects for the Plating Bath.

scientific men could think that, by a collision between the earth and a comet, "this most beautiful order of things would be entirely destroyed and reduced to its ancient chaos"; but this fear was taken as a "by-the-bye," which happily interfered with neither observations nor calculations. Observations had duly been made. The data were used to obtain the elements of the orbit, employing Newton's theory as a working hypothesis; and he expresses an incidental regret as to the intrinsic errors of assumed numerical elements and of recorded observations. It then occurred to Halley to calculate similarly the elements of the comet which Kepler and others had seen in 1607, and of which records had been made; the Newtonian theory gave elements in close accord with those belonging to the comet calculated from the latest observations, though a new regret is expressed that the 1607 observations had not been made with more accuracy. On these results he committed himself (being then a man of forty-nine years of age) to a prophecy (which could not be checked for fifty-three years to come) that the comet would return about the end of the year 1758 or the beginning of the next succeeding year; he was willing to leave his conclusion "to be discussed by the care of posterity, after the truth is found out by the event." But not completely content with this stage of his work, he obtained with difficulty a book by Apian, giving an account of a comet seen in 1531 and recording a number of observations. Halley, constant to his faith in the Newtonian hypothesis, used that hypothesis to calculate the elements of the orbit of the Apian comet; once more regretting the uncertainty of the data and discounting a very grievous error committed by Apian himself, Halley concluded that the Apian comet of 1531, and the Kepler comet of 1607, and the observed comet of 1682 were one and the same. He confirmed his prediction as to the date of its return, and he concludes his argument with a blend of confidence and patriotism:

"Wherefore if according to what we have already said it should return again about the year 1758, candid posterity will not refuse to acknowledge that this was first discovered by an Englishman."

Such was Halley's prediction published in the year 1705. The comet pursued its course, and it was next seen on Christmas Day, 1758. Candid posterity, so far from refusing to acknowledge that the discovery was made by an Englishman, has linked Halley's name with the comet, possibly for all time.



Plating Room, Showing Battery of Electro-Mechanical Plating Vats.

A MECHANICAL ELECTRO-PLATING APPARATUS.

The Carbonic Acid Pump.

The city of Hanover has in its fire service a carbonic acid pump working in connection with a steam pump. While the acid pump is actuated by a battery of storage cells the steam pump, which is on an automobile, is conducted to the locality of a fire by means of carbonic acid compressed in tanks. The charcoal briquettes are placed on the grate and watered with alcohol from a receptacle, where it is kept under pressure by carbonic acid. The water in the boiler is always kept at the temperature of 212 deg. F. by means of a small gas burner. —Nouvelles Scientifiques.