A NEW SPEED INDICATOR FOR MARINE PROPELLERS.

When the steamship "Perry G. Walker" collided with the lock gates at Sault Sainte Marie, causing the wreck of two other steamers and doing damage to the locks which required weeks for repair, the captain stated under examination that he had signaled to his engineer to go astern, but that his signal had somehow been misunderstood, and the engines had started full-speed ahead. Such an accident is conclusive and incontrovertible evidence of the need of a reliable system of indicating the direction and speed of rotation of the propellers of vessels. It is but one instance of a chapter of marine accidents occurring annually from either the incorrect interpretation of signals given to the engine room from the bridge or the execution of signals given by the bridge which, owing to mental stress from impending accident, are incorrectly given. It is always extremely difficult for a board of inquiry to determine just with whom the error lies.

In the above instance, it is claimed by the captain that the correct signals were given, but instead of the engines being reversed at the critical moment, they were sent ahead; and before the error was discovered, such headway had been gathered by the vessel as to preclude all hope of stopping her within the limited lock space.

There is no question of the importance of enabling the captain and pilot to be at all times familiar with the interpretation and execution of signals. Errors are thereby immediately discernible, and correspondingly corrected before damage is done.

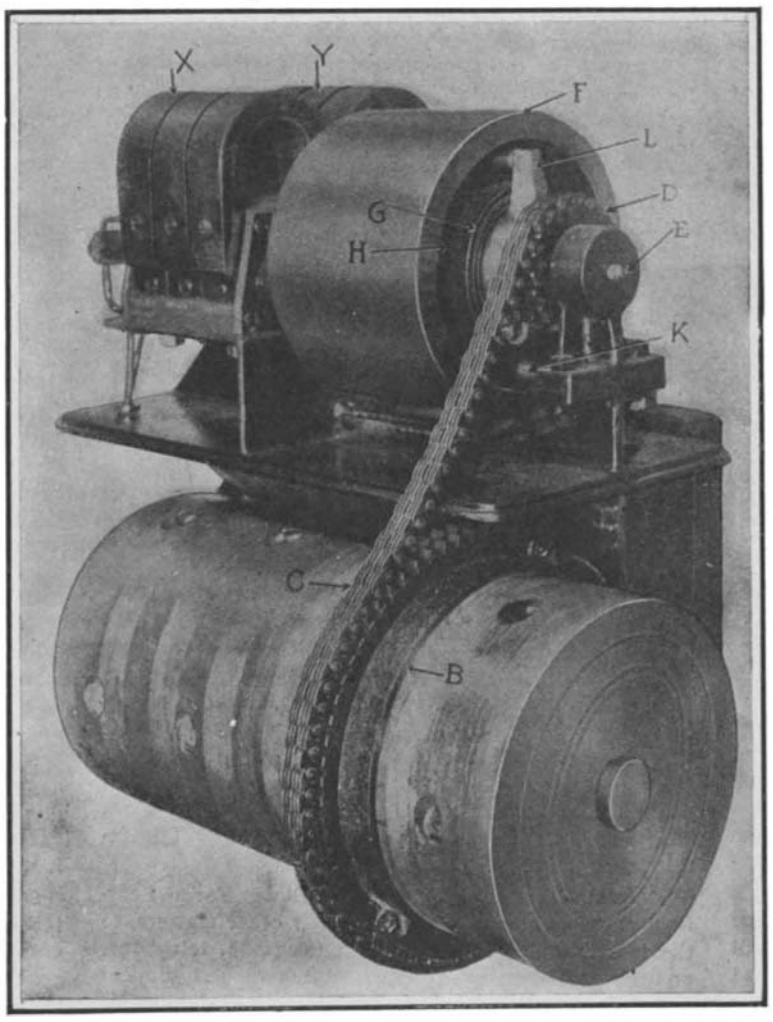
In the absence of a tachometer to show at a glance the rate in revolutions per minute at which the propeller shaft is turning, signals are executed by the engineer according to his best judgment. For instance, the execution of "half speed astern" may vary eight or ten revolutions per minute, and the pilot, depending upon a speed-checking effect, may be thrown off in his calculations by too slow a rate of turning of the engines.

When equipped with a tachometer system, however, the signals can be obeyed at an exact predetermined propeller-shaft speed, with corresponding increased accuracy and efficiency of handling the vessel. Warships in line or column formation must correctly execute the orders of the flagship, setting their speed to conform to the desired headway between ships, quickly and accurately. Otherwise a collision is probable.

The absence of an accurate and dependable tachometer up to the present, has made it necessary to arrive at the revolutions per minute by noting the turns successively by the revolution counter for preferably at least a half minute. If the speed of the shaft is too high, a rough guess must be made as to how much the throttle is to be closed, and another counting gone through. All this takes time, and is on too much of a cut-and-try system. With a tachometer to guide him, the man at the throttle has but to operate the throttle until the pointer of the tachometer rests on the desired R. P. M.

Range finding, for the accurate sighting of the guns, includes the determination of the distance of the object to be fired at, angle at which the warship is approaching or receding from the target, and the speed at which the vessel is traveling.

The first two factors are quickly and accurately determined by means of the modern range finder in the hands of skilled men, located on the masts or range towers of the warship. This is telephoned to the fire control sub-station. It then becomes imperative that the rate at which the engines are turning over at that instant be immediately determined, in order that the



A NEW SPEED INDICATOR FOR MARINE PROPELLERS.

proper instructions may be telephoned at once to the turrets. The sooner the discharge of the projectile is effected after the range has been determined, the more accurate is the aim, and the greater the execution done.

In these calculations, the effect on ship speed by propeller speed, taking into consideration the extent and direction of wind and tide, is quickly and accurately calculated.

Relation between ship speed and propeller speed is frequently calibrated with due reference to increased fouling of the ship's bottom from marine growth, and is immediately available. Even when the engine-room forces are endeavoring to maintain an exact prearranged speed of rotation, this speed often varies, owing to the absence of accurate deadbeat tachometers for indicating at all times the rate of revolution.

Aside from the strategic advantages of a tachometer for indicating engine speed of rotation, the economic

(*Continued on page 167.*)

POWERFUL HOISTING AND CONVEYING MACHINE.

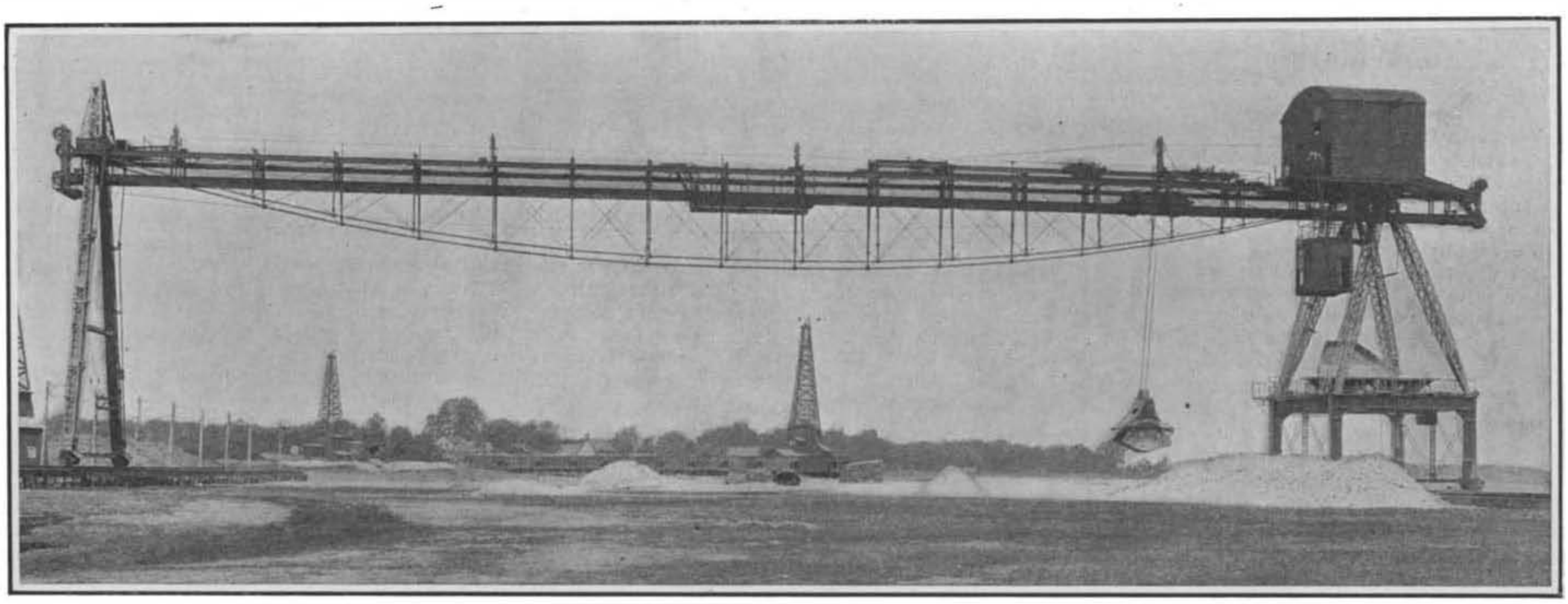
Nowhere in the field of mechanical engineering has American ingenuity in the design of labor-saving plants been shown to more striking effect than those great hoisting and conveying plants, which are such a prominent factor in our modern constructive and industrial operations. The rapid and cheap raising, removal, distribution and deposit of materials in large bulk is one of the most serious problems of the day; and it is the ingenious solution offered by American hoisting and conveying apparatus that has enabled our engineers to dig canals, build embankments, handle enormous loads of coal, iron ore, wheat, and corn with an economy undreamed of in an earlier day. We present illustrations of a powerful electric bridge tramway, designed and erected by the Brown Hoisting and Machinery Company for the Michigan Alkali Company, which is an excellent sample of the type of machinery above referred to.

The bridge, which is designed to handle the limestone in the stock yard of the company, has a span of 256 feet from center of pier to center of shear, with the center depth of 17 feet, and the total over-all of the structure is 286 feet 4½ inches. The height from top of rail to top of bridge at the shear is 59 feet 9 inches, and at the pier 61 feet 9 inches, the bridge being level. To the bridge span and its projection is attached a runway carrying a special trolley, arranged to handle either a two-rope grab bucket or a scraper bucket.

The pier consists of two specially designed shear legs mounted on a portal structure, arranged to straddle over two lines of railway track. The two shears are joined together at the top by a yoke connection, designed to carry the bridge structure. By this arrangement a free opening is allowed for the passage of the buckets through the pier support. The structure of the pier throughout is of medium open-hearth steel. The portal or lower portion of the pier consists of two pairs of legs joined together by girders and braces, and arranged to carry a bin for the reception and distribution of the limestone. The lower portion of the portal is mounted on four two-wheel equalizing trucks. These wheels are connected by bevel and spur gears to the driving machinery in the house on the bridge. The shear-leg support is of A-frame construction, mounted on two-wheel equalizing trucks, arranged to run on a single line of rail. At the top of the shear is a ball casting, upon which the main bridge is hung. The track wheels are connected with the moving gear in the engine by bevel and spur gears.

The bridge span consists of two parabolic pin-connected trusses, supporting the cross beams, from which the track stringers are suspended. The bridge span is supported on the pier support by roller bearings, and held in place by a vertical center pin. At the shear support it is hung from a ball-and-socket connection, in such a manner that the bridge may be skewed in either direction from its normal axis, so as to give an angle of one foot crosswise to nine feet lengthwise of the bridge span. The moving gear is operated from the main operating mechanism located

(*Continued on page 169.*)



Length over all, 286 feet 4½ inches; depth of trusses, 17 feet; height of bridge above ground, 61 feet 9 inches.

Hoisting and conveying machine; capacity 200 tons per hour.

POWERFUL ELECTRIC HOISTING AND CONVEYING MACHINERY.

Printing press, B. F. Upham 931,099
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Propeller for boats, drop, F. E. Stribling.. 931,159
Propeller mechanism, collapsible, W. Morgan 931,456
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Pump, piston, H. P. Wedin 931,535
Punching machine, W. B. Kilgore 931,431
Push button apparatus, R. D. Burk 931,380
Putting out machine, F. J. Perkins 931,340
Puzzle, H. W. Cadwell 931,677
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Rail joint, J. S. Hickson 931,117
Rail joint, T. K. Diehl 931,577
Rail joint, Frederick & Chapman 931,589
Rail joint truss support, L. Mueller 931,459
Railway cattle guard, J. H. Wheeler 931,537
Railway construction, H. C. Grant 931,418
Railway frog, B. J. Morgan 931,073
Railway joint, D. B. Coupland 931,275
Railway overhead line construction, electric, T. Varney 931,354
Railway, pleasure, C. M. Perdew 931,705
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Railway spike, C. L. Columbia 931,272
Railway switch, O. C. Jefcoat 931,428
Railway switch, automatic, G. E. Toullerton 931,660
Railway tie, J. F. Schneider 931,226
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Reflector, lantern, O. A. Prunner 931,482
Rein or neck strap line terret, S. E. Harsh. 931,298
Reinforcing bar, A. E. Lindau 931,322
Releasing device, C. Hunt 931,122
Resinous matter, recovering, W. J. Hough. 931,608
Reticule, E. Lazarovich-Hrebelianovich 931,627
Reversing apparatus, G. Schulz 931,501
Rheostat, multiple switch, O. S. Schairer.. 931,148
Ring traveler holding and delivering means, J. C. Edwards 931,690
Rivet setting machine, A. R. Havener 931,062
Rock drill, W. E. Porter 931,479
Rock drill or boring tool, J. Hutchings 931,611
Rod. See Fishing rod.
Rolling mill tube trough, Worth & Harrison 931,543
Rolling pin, H. E. Fendring 931,691
Rotary engine, C. McQuown 931,077
Rotary machine, C. G. Conn 931,638
Routing machine guide device, W. H. Ablers 931,552
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Rubber like gum from its vegetable sources, extracting, F. H. Hunicke 931,120, 931,121
Sad iron, self heated, A. H. Davis 931,686
Safety switch, J. T. Krieger 931,208
Sand blast blower, D. A. M. Doublet 931,579
Sash lifter, R. Corbin 931,388
Sash lock, J. L. Grether 931,194
Sausage machine, J. Wunurach 931,363
Saw feeding mechanism, H. B. Ross et al. 931,223
Saw frame, flexible, C. Kusch 931,435
Saw set and clamp, F. W. McLean 931,076
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Scarf holder, E. H. Rose 931,147
Seal, J. A. Beauerle 931,670
Seal, car, F. W. Brooks 931,379
Separator, A. J. Morlock 931,457
Sewing machine attachment, C. D. Armstrong 931,369
Sewing machine grinding attachment, G. I. Green 931,597
Sewing machine looper mechanism, F. E. Valois 931,352
Sewing machine, overseaming, A. Grieb.. 931,058
Sewing machine ruffler, W. R. Parsons.. 931,641
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Sleeve closure, W. S. Barker 931, 49
Smoothing iron, S. G. Buskard 931,381
Snap hook, T. Forstner 931,588
Snow plow, C. A. Bellrud 931,559
Solder for aluminium, Z. Tamassy 931,523
Sole edge burnishing machine, Z. Beaudry. 931,558
Sole, galvanic, Kennedy & Davis 931,068
Spectacle frames, manufacturing, R. H. Simonds 931,508
Sprayer, D. O. Bowman 931,030
Spraying device air chamber, liquid, A. M. Phillips 931,215
Spring wheel, L. Flum 931,048
Spring wheel, W. H. Wildrick 931,241
Spur, folding, J. D. Hayes 931,063
Stalk cutter, J. A. McKay 931,635
Stamping machine, E. B. Wilhelm 931,170
Steel, method and apparatus for treating, W. E. Nickerson 931,332
Steels for industrial purposes, treatment of, E. Schneider 931,499
Stencil, T. C. Hough 931,309
Stirrup, G. W. Hooks 931,607
Stoker, underfeed fuel, G. Weiland 931,536
Stopper, K. Friedman 931,406
Stopper, B. J. Morrison 931,458
Stove, gas cooking, L. Kahn 931,312
Stove, heating, A. K. Beckwith 931,374
Stovepipe holder, J. N. Queen 931,086
Strainer, R. H. Carlisle 931,564
Strainer or cooker, vegetable, W. Leetten.. 931,070
Street inlet and water closet flush, automatic, odorless, self-cleaning, J. Pratt. 931,481
Structural parts, means for preserving, A. Knapen 931,318
Sugar, producing milk, A. A. Dunham 931,584
Sunshade holder, E. H. Atkinson 931,371
Surgical knife, E. Huttmann 931,612
Sweep rake, Brown & Keithly 931,675
Switch key, N. H. Holland 931,202
Swivel hook, W. R. Clarkson 931,270
Syringe, A. Bean 931,113
Tag fastener, Harris & Flood 931,420
Talking machine stylus replenishing mechanism, Beulna & Burson 931,676
Tanks from bursting by freezing, means to prevent, A. Ballard 931,112
Tap, Turner & Digman 931,526
Telegraph and selective system therefor, automatic, A. C. Gilmore 931,055
Telegraph and telephone pole, J. H. Hile. 931,425
Telegraph pole arm, L. Tyreman 931,661
Telegraphy and telephony, receiver for wireless, S. Eisenstein 931,586
Telephone deck stand, J. A. Birsfield 931,179
Telephone exchange selector, automatic, F. H. Loveridge 931,072
Telephone exchange switchboard apparatus, J. L. McQuarrie 931,330
Telephone exchange system, measured service automatic, W. W. Leach 931,132
Telephone instrument mounting, H. E. Shreeve 931,231
Telephone key, J. L. McQuarrie 931,331
Telephone service rent collecting means, R. Yearneau 931,547
Telephone system, private branch intercommunicating, J. L. McQuarrie 931,138
Telephone system, private branch intercommunicating, N. H. Holland 931,307
Telephone transmitter, A. G. Kaufman.... 931,127
Telephone transmitting mouthpiece, R. E. Miller 931,452
Threshing machine, H. O. Sageng 931,347
Tie. See Cross tie.
Tie plate, A. L. Stanford 931,517
Time recorder, W. Beresford 931,254
Tire antiskidding device, T. I. Duffy 931,284

(*Concluded from page 168.*)

of magnetos supplying all the indicators, which are connected in multiple.

A very important fact in Mr. Hutchison's system is the use of an exceedingly small current value and low voltage; hence, in the event of the indicators being located in proximity to ammunition, should the circuit be opened by the breaking of a wire or otherwise, the resultant spark is barely perceptible and cool, therefore incapable of igniting anything. Should the line become short-circuited, no heating effect whatever is produced and no damage done to the magnetos, as they can run for an indefinite time on dead short circuit. No effect is produced on the compass by the current in the wires, and, taken all in all, the system seems to meet every requirement of accuracy and safety.

POWERFUL HOISTING AND CONVEYING MACHINE.

(*Continued from page 156.*)

in the machinery house at the pier end of the bridge, the power from which is transferred to the moving gear wheels by a line of shafting on top of the bridge, thence to lines of shafting down the pier and shear supports, and thence by a proper train of gears to the wheels.

The moving gear mechanism is attached to the operating mechanism by means of friction clutches, so arranged that the motion of the crane may be made in either direction at the will of the operator. Further provision is made for disconnecting the gearing, in order to skew the bridge within the limits given.

The main operating mechanism for the bridge is located in the machinery house, and consists of two drums. Each of these drums is mounted loose on its supporting shaft. Each drum is controlled by a Brown friction clutch and a band friction brake. The drums are connected one to the other through an equalizing gear mechanism, which is equipped also with a powerful foot brake, so that the two main operating drums may be made to rotate in opposite directions with the same speed. This feature of connecting the two drums is one of the all-important points in the Brown two-drum operating mechanism. The main operating machinery is further arranged to operate from the intermediate shaft the bridge crane moving gear mechanism, to which the supporting truck wheels are connected by shafting and gearing. This mechanism is controlled also by a powerful clutch and band friction foot brake.

In further connection with the two main operating drums is a small closing drum which, in conjunction with the two main drums, controls all of the motions of hoisting and lowering the load and traveling the trolley. The trolley, which in reality forms also a part of the main hoisting mechanism, is specially designed to operate in conjunction with the drum arrangement above described. In general, this trolley consists of a steel structural frame mounted on four turned cast-steel track wheels arranged to run on the trolley runway of the bridge crane. In the trolley there are mounted specially-designed drums, which run loose on their supporting shafts. The large section of each drum on the trolley is connected to the main hoisting drums in the machinery house in the following manner:

One length of wire rope will connect, from the under side, one of the main hoisting drums to the top side of one of the large sections of the trolley drums. The under side of this trolley drum is connected by wire ropes to the top side of the other main hoisting drum. The top side of this same hoisting drum is connected by suitable cable to the top side of the other trolley drum, and likewise this trolley drum from the under side is connected to the underside of the other main hoisting drum. By this arrangement of ropes, if one of the main

(*Continued on page 170.*)

Classified Advertisements

Advertising in this column is 75 cents a line. No less than four nor more than ten lines accepted. Count seven words to the line. All orders must be accompanied by a remittance. Further information sent on request.

READ THIS COLUMN CAREFULLY.—You will find inquiries for certain classes of articles numbered in consecutive order. If you manufacture these goods write us at once and we will send you the name and address of the party desiring the information. There is no charge for this service. **In every case it is necessary to give the number of the inquiry.** Where manufacturers do not respond promptly the inquiry may be repeated.

MUNN & CO.

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AGENTS WANTED.—$2.19 sample outfit free. 50 per cent. profit. Credit given. Premiums. Freight paid. Chance to win $500 in gold extra. Let the largest wholesale agency house in the United States start you in a profitable business without one cent of capital. Experience unnecessary. Write for free outfit at once. McLean Black & Co., Inc., 60 Beverly St., Boston, Mass.

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FOR SALE.—Model Printing Press Co. Established over 40 years. Excellent opportunity for machinist. Mail order trade throughout the world. Will sell at a bargain. Model Printing Press Co., Chambersburg, Pa.

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MAIL ORDER GOODS WANTED.—Western firm wants quotations from manufacturers of quick-selling household specialties suitable for canvassers. Address Box 103, Victoria, B. C.

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FOR SALE.—Patent No. 930,734. Metal shelf with folding brackets, as illustrated in Scientific American of August 28, 1909. Now being manufactured and marketed in New York and surrounding States with good results. Rights to distant States can be obtained by responsible manufacturers by applying to The Dahl Mfg. Co., 302 W. 14th Street, New York.

Inquiry No. 8922.—Wanted the address of Worthington Boiler Co.

FOR SALE—Patent No. 726,166. Purse or the like, chain purses, neck chains, fobs, belts, etc. For further information and particulars, Address P. O. Box 67, Attleboro, Mass.

Inquiry No. 8931.—For parties who manufacture the Western Stump Borer for boring stumps.

FOR SALE—Patent No. 895,863, rowing appliance; works perfectly, every boatman needs a pair. Make us an offer. James & Deacon, Velasco, Texas.

Inquiry No. 8941.—For manufacturers of machinery for making fly screens.

FOR SALE.—Patent No. 915 305. Metal telephone pole. Most durable, strongest, lightest and cheapest pole in existence. Address E. J. Newhall, Waupaca, Wis.

SALESMEN WANTED.

SALESMAN WANTED to handle an exceptionally attractive real estate and timber proposition, which can be sold on annual, semi-annual or monthly installments. We furnish inquiries and strong literature. Capable, aggressive, energetic man can make desirable connection with the largest and strongest house in its line in the country. Sacramento Valley Imp. Co., St. Louis, Mo.

Inquiry No. 8960.—For the address of the Windsor Mfg. Co., manufacturers of waterproof collars and cuffs.

HELP WANTED.

LOCAL REPRESENTATIVE WANTED.—Splendid income assured right man to act as our representative after learning our business thoroughly by mail. Former experience unnecessary. All we require is honesty, ability, ambition, and willingness to learn a lucrative business. No soliciting or traveling. This is an exceptional opportunity for a man in your section to get into a big paying business without capital and become independent for life. Write at once for full particulars. Address E. R. Marden, Pres., The National Co-operative Real Estate Company, Suite 378, Marden Building, Washington, D. C.

Inquiry No. 8966.—Wanted the address of the Cohendet Motor Co.

SUCCESSFUL Gasoline Light Salesmen to handle the only instantaneous lighting system known to science. No alcohol, step ladders, torches, matches or time wasted. Pull the chain and they light instantly. For home and commercial lighting. Write for territory. Small capital required. Gloria Light Co., 1285 Wash't'n Blvd., Chicago.

Inquiry No. 8969.—Wanted machines that make accordion dress plaiting (steam).

YOUNG MAN, graduate of some school in mechanical engineering, for position in woodworking plant in small Tennessee town. Good opportunity for advancement. State experience, if any, and salary. Answer "Position," Box 773, New York.

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COMPLETE LISTS of manufacturers in all lines supplied at short notice at moderate rates. Small and special lists compiled to order at various prices. Estimates should be obtained in advance. Address Munn & Co., List Department, Box 773, New York.

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Inquiry No. 8987.—Wanted, the manufacturers of the Van Winkle, Woods & Sons, and the Weber power meters.

Inquiry No. 8990.—For information regarding shoes not made of leather but similar to the same and are as durable.

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Inquiry No. 8997.—Wanted the address of the manufacturers of bread or cake boxes.

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Inquiry No. 9007.—Wanted, a tin churn for churning milk that has a wire spring at top and bottom of churn and operated by pressing the wire springs.

Inquiry No. 9009.—Wanted the address of the manufacturer of the "Leech" showcard holder, a device which is held to the outside of a show window by rubber cups.

Inquiry No. 9010.—Wanted to buy a "Rector Help-a-Phone."

Inquiry No. 9011.—For the manufacturers of a patent sewing needle that is made to slip over the thread; the eye is split so as to open and receive the thread.

Inquiry No. 9012.—Wanted to buy papier mache boxes in the shape of water melons, colored to resemble melons, etc.

Inquiry No. 9014.—For manufacturers of machinery, supplies, etc., to equip a small plant for the manufacture of iridium-tipped gold nib making for fountain pens.

Inquiry No. 9015.—Wanted the address of the manufacturers of a solid, link chain made without welding, made in brass, several different sizes, made on an automatic machine.

Inquiry No. 9016.—Wanted, machinery necessary for an installation of a plant for refining salt by a modification of the Bessemer process.

Inquiry No. 9017.—Wanted, the address of manufacturers or dealers in card board plaster or wood pulp for plastering.

Inquiry No. 9018.—Wanted, the address of parties manufacturing gold-plated pens for use in cheap fountain pens.

Inquiry No. 9019.—Wanted, address of The Old Town Canoe Co.

Inquiry No. 9020.—Wanted the addresses of the manufacturers of metal novelties.

(Continued from page 169.)

hoisting drums is connected through its clutch mechanism to the driving shaft, and the other main hoisting drum is allowed to work through the equalizing gear mechanism loose on its supporting shaft, the motion of the drums will be in opposite directions and with the same speed, and when working under this condition the motion produced on the trolley drums will be *nil*, thus giving to the trolley a motion or translation along its supporting runway, and by the reversal of the motion of the main hoisting drums the trolley will be traveled in an opposite direction. Further, if the main hoisting drums are both rotated in the same direction, the drums on the trolley will be rotated in opposite directions with respect to one another, and by the proper reeving of the ropes from the small drums on the trolley, the suspended load may be raised and lowered by the reversal of the motions of the main hoisting mechanism. When equipped with grab bucket, the opening and closing of the same is accomplished by the ropes leading from one of the main trolley drums. The shell lines from the grab bucket are attached to the other of the main trolley drums, and for the same reasons as given above, the bucket may be raised and lowered. But to carry out the motion of opening and closing, the two main hoisting drums in the machinery house are held stationary, and the small auxiliary hoisting and closing drum is put in operation. This drum is connected to a sliding loop attachment located at a convenient point on the bridge structures, and in such a way that the ropes leading from the large section of the drum controlling the opening and closing lines of the bucket are reeved through this sliding loop mechanism, and, by the operation of this closing drum, the one set of lines leading to the trolley is lengthened while the other set is shortened. By this means the one drum, controlling the opening and closing of the bucket, may be rotated in either direction by the proper operating of the closing drum above referred to. From this description it will be seen that in reality the main hoisting mechanism consists of the two main hoisting drums and the auxiliary closing drum, all of which drums are under the complete control of the operator, and work in conjunction with one another to properly carry out the various motions of the trolley and its load.

In the operation, however, of the scoop bucket, with which the above bridge crane is equipped, only one main drum on the trolley is used, this being the drum operating the shell lines of the grab bucket. The lines leading from the small drum sections of this main drum are arranged to work in parallel and carry the shovel bucket. All of the clutches, brakes, etc., going to make up the main operating machinery are connected to the operator's cage by suitable rods and levers, so that the entire mechanism is under the complete control of one operator.

The 200 horse-power motor and electrical equipment is designed so that dur-

(Concluded on page 171.)

Practical and Instructive Scientific Books

AGRICULTURE.—The New Agriculture. By T. Byard Collins. 12mo.; 374 pages; 106 illustrations.....$2.00

A popular outline of the many changes which are revolutionizing the methods of farming, and the habits of farm life. It is one of the most practical treatises on the subject which has ever been issued.

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This is a thoroughly practical book by the most noted amateur experimenter in America. It appeals to the boy as well as the more mature amateur. Holidays and evenings can be profitably occupied by making useful articles for the home or in the building of small engines or motors or scientific instruments.

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(*Concluded from page 170.*)

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MEASURING A RIVER'S FLOW.

(*Concluded from page 160.*)

the velocity recorded at a number of different depths in each strip. By the vertical integration method the meter is moved at a slow uniform speed from the surface of the stream to the bottom and back again.

For convenience of reference and comparison the results obtained are plotted in the form of a curve on a chart.

Another illustration shows the Great Falls of the Missouri River in Montana. A gaging station at the point from which the photograph is taken was established by the Geological Survey in July, 1902.

The river is favorable at this point for water-power development and shows the kind of stream, apart from navigable rivers, measured and reported upon by the Survey. In this way the Survey constantly brings to the attention of the investing and developing public many previously unnoticed but valuable water-power sites.

We are indebted to the director of the U. S. Geological Survey for the use of the accompanying illustrations.

THE AVIATION MEETING AT RHEIMS.

(*Concluded from page 159.*)

with their Bleriot monoplanes. Both Bleriot and Curtiss tried to lower their speed records for one circuit of the course, and the latter succeeded in making 2 seconds better time than before. His time of 8:09 1/5 corresponds to almost 45.7 miles an hour. Bleriot made the circuit in 8:08 2/5, which was 4 seconds slower than formerly.

At the end of 2 hours, 22 minutes, and 51 seconds, Farman had flown 140 kilometers (86.99 miles) and beaten Paulhan's record. It was getting dark rapidly and the spectators could only see the machine as it passed before the grand stand. Ten minutes and 19 seconds later he completed his fifteenth round, and less than five minutes later he had beaten Latham's record. One hundred and sixty kilometers (99.4 miles) were covered in 2:43:35 2/5, and 180 kilometers (111.88 miles) in 3 hours, 4 minutes, 55 2/5 seconds. As it was now 7:30, the nineteenth round afterward made by Farman was not counted in the official figures. He actually covered over 190 kilometers (118.06 miles) and remained in the air all told about 3¼ hours. As he finished in front of the grand stand a searchlight was thrown upon him. He was pulled from his machine and carried upon the shoulders of his friends, receiving a decided ovation. Thus, for the second time, he has won a $10,000 cash prize, the first instance being when he flew 1 kilometer in a closed circuit on January 13th, 1908. It is possible that he will try again to win this sum by making the 140-mile flight from New York to Albany. In the flight for the Grand Prix, he carried enough fuel to fly 3½ hours.

The other prizes awarded in the Grand Prix de la Champagne distance race were as follows:

Second, $5,000, won by Hubert Latham on his Antoinette monoplane. Distance, 154.5 kilometers (96 miles).

Third, $2,000, won by M. Paulhan with his Voisin biplane. Distance, 131 kilometers (81.4 miles).

Fourth, $1,000, won by Count de Lambert with his Wright biplane. Distance, 116 kilometers (72.1 miles).

Fifth, $1,000, won by Paul M. Tissandier. Distance, 111 kilometers (68.97 miles).

Sixth, $1,000, won by M. Roger Sommer with a Farman biplane. Distance, 60 kilometers (37.3 miles).

The distances covered by the other competitors were: 50 kilometers (31.1 miles) by M. Delagrange, with a Bleriot monoplane; 40 kilometers (24.9 miles) covered by M. Bleriot with one of his monoplanes; 30 kilometers (18.64 miles) covered by Mr. Curtiss with his biplane; and 21 kilometers (13.04 miles) covered by M. Lefebvre with his Wright machine.

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