Every Automobile Its Own Elevator

By Robert G. Skerrett

ONE of America's biggest problems is to eliminate lost motion in every phase of transportation—using that term in its widest sense. It costs money to move anything any distance, for the work involves an expenditure of time and effort. Whenever commodities are shifted from one conveying medium to another there is a break that halts for the nonce the steady flow of the goods. Trite as these facts are, and well known by every traffic expert, it is doubtful if the average citizen realizes how much more he has to pay in the long run because of the interruptions in the transportation tide.

The automotive vehicle is doing much to bridge the gap between terminal facilities; it is speeding up the transfer of merchandise where formerly the service limped; but the great majority of owners of cars and trucks have not yet awakened to the full potentialities of these vehicles as carriers. In industrial and business circles, for instance, it has occurred to comparatively few that it is entirely practicable to utilize the hill-climbing powers of the truck and car to link directly the floors of shops, factories, warehouses, garages, etc., with the public highways, and thus to avoid dependence upon the elevator as an intermediate agency.

Take the general run of department stores, manufacturing establishments, and bustling warehouses, and what is the usual procedure in getting wares, products, and freight broadly in and out of the buildings? Well-nigh invariably, inter-floor movement is effected by means of more or less capacious elevators. These lifts use a platform on the ground level as the link between themselves and the delivery wagons and trucks that bring in or take away the various commodities involved. The mind instinctively pictures the series of handlings necessary to deal either with outbound or arriving goods.

Without any intention to underestimate the elevator, it should be plain that much might be saved if every story could, in effect, be just as accessible to the motor vehicle as the ground floor, and this without the help of the freight lift. Why not make it practicable for trucks and delivery cars to climb directly to any floor of a business or industrial establishment, there to load or unload as the case may be? This can be done.

Of course, many of us are familiar with those inclined extensions of the street, commonly termed ramps, which make it possible for motor vehicles to get in and out of the basements or to reach one or more of the floors of a structure above the ground level. This means of ingress and egress has been adopted for a goodly number of garages, and has served to obviate the installation of elevators. While a step in the right direction, these ramps have

1. Section through the engine. The pistons move in and out together. The intake ports are seen at the right and the exhaust ports at the left. The big openings above and below the former are the passages which deliver air from the blower to the intake ports. The spark plug is above the combustion chamber, with the fuel injection pipe directly beneath it. 2. The engine on the test stand. The cranking mechanism, water pump and magnetos are seen at the right end; the peculiar stick-up pipe is the exhaust. 3. The engine partly assembled, showing cylinders and upper half of crankcase

Junker engine of modified Diesel type for airplane use

compelled sacrifices in revenue-making space that have minimized the economies promised by the abandonment of the lift. Let us make this clear.

Where the inter-floor space has an average height of 12 feet, for instance, the gradient of the ramp must not be too steep to make it easy and safe for the motor car or truck to climb or to descend from floor to floor. Accordingly, an ordinary ramp, with its end turns, calls for a linear span of approximately 140 feet, of which at least half is required for the ramp alone. (Where the ramps are carried to succeed-

(Continued on page 75)

Sectional views of two garages with staggered floors, equipped with a central motor ramp in place of an elevator. The larger seems practical also for heavy inter-floor movements in warehouses, etc.

A Near-Diesel Engine for the Airplane

By Harold F. Blanchard

NOTHING could be more interesting, to those familiar with internal combustion problems, than the news that the Diesel engine has been successfully applied to airplane practice. The new engine has been installed in a German monoplane and was designed by Professor Junkers. The advantages claimed are those of low weight per horsepower, increased reliability, higher fuel economy, greater simplicity, safety against fire, and perfect balance.

In order to appreciate fully the features of this engine it is necessary to explain the Diesel engine principle. In the true Diesel neither carburetor nor ignition is employed. The compression is extremely high. Instead of employing a maximum compression pressure of 80 to 100 pounds as in the ordinary designs with which we are familiar, compressions as high as 600 or 700 pounds are employed. The extreme compression raises the air to a very high temperature so that when a carefully measured quantity of fuel is injected into the cylinder at just the right

moment the air is so hot that the fuel immediately takes fire. "Throttling" of the engine is obtained by varying the quantity of fuel delivered. The injection of the fuel, by the way, occurs in the instant just before the piston reaches top dead center. The fuel is immediately vaporized by the excessively hot air and is thoroughly distributed throughout the combustion chamber almost instantly. From this consideration of the subject it is plain that the Diesel engine is a type in which the compression pressure is constant whereas in the ordinary type used in airplane work the compression pressure is varied according to the demand by opening and closing the throttle.

When Diesel engines were first produced they attracted considerable attention because of their unusual economy; no type of prime mover has yet been devised that approaches the true Diesel here. This economy is due to the fact that a constant compression cycle is more efficient than a variable compression cycle, and also because efficiency increases with the compression pressure which is very much higher in the Diesel than in other types.

The Diesel was long considered out of the question for use in automobiles or airplanes because of its extreme weight. It was necessary to make the cylinder very heavy because of the high pressures generated in it, and the reciprocating parts had to be strong to stand the high acceleration forces developed.

The Junkers Diesel engine is a modification of the true Diesel in that high but not extreme compression pressures are used (about 210 pounds); and because of this reduction in pressure jump-spark ignition is used to ignite the charge. It is a six-cylinder two-cycle, with

(Continued on page 79)

Are You Going After Foreign Trade?

If so are you sure that your inventions and trade-marks actually belong to you in foreign markets? Unless you avail yourself of the right to acquire foreign patents and trade-mark registrations, you may find that another has preceded you and has actually appropriated your inventions and trade-marks and obtained legal ownership thereof, whereby he can bar your goods from foreign markets. Such a proceeding is permissible under the laws of many foreign countries.

Many have lost their markets in certain foreign countries by overlooking this fact.

Many of our clients are preparing to extend their business by seeking patent and trade-mark protection in foreign countries.

We should be glad to have you avail yourself of our services.

Foreign Patent and Trade-mark Department

MUNN & CO.

Woolworth Building
New York City

ICE MACHINES Corliss Engines, Brewers and Bottlers' Machinery
The VILTER MFG. CO.
899 Clinton Street Milwaukee, Wis.

We Will Make It
Anything in a metal stamping or novelty produced from any metal and finished in any color.
Waterbury Button Co., Waterbury, Conn.

Experimental and Model Work
Fine Instruments and Fine Machinery, Inventions Developed.
Special Tools, Dies, Gear Cutting, Etc.
HENRY ZUHR, 489-93 Broome St., New York City

ASBESTOS

We are miners and shippers of Crude Asbestos in any quantity. We produce all grades at our world famous BELL ASBESTOS MINES in Canada. We also carry fibres, spin yarns, weave cloths, and make all sorts of Asbestos products.

For anything you want in Asbestos, turn to
KEASBEY & MATTISON COMPANY
DEPT. S-1
AMBLER, PENNA., U. S. A.
Owners of the world's largest Asbestos Mines

Every Automobile Its Own Elevator

(Continued from page 75)

to depend upon elevators to transport a few units at a time—again making up the train when the desired level is reached. The motor ramp is designed so as to avoid this interruption to speedy transfer and lends itself to the inter-floor travel of these trailer trains in their entirety.

Without further elaboration, it should be self-evident that the d'Humy system is susceptible of meeting a very wide range of service demands, and may be the means of doing away with operations that now occasion much loss of time and the imposition of heavy charges. Finally, let it be said that the immediate future of the automotive industry is dependent upon the prompt providing of ample garage facilities in our principal cities. Many a prospective car owner is hesitating because he cannot be sure of a convenient place in which to house such a vehicle; and it is likewise vital that these accommodations be offered at prices that will be in keeping with the average purse. The motor ramp, as Mr. d'Humy has conceived it, seems to offer the relief so much desired. His solution of a vexed problem is so simple that one wonders why it has not been developed before.

A Near-Diesel Engine for the Airplane

(Continued from page 65)

two pistons per cylinder; it possesses no valves.

As shown by the illustration the pistons are opposed *head on*, there being two separate crankshafts, one for each six pistons. The two crankshafts are connected by gearing at one end of the crankcase. One piston uncovers the intake ports when it nears the bottom of its stroke and the other piston uncovers the exhaust ports. The exhaust ports are larger and are uncovered first. The cycle of events during one complete revolution is as follows, beginning with the piston at top dead center on the compression stroke. A measured quantity of fuel has just been sprayed into the chamber through the nozzle seen in the bottom of the sectional drawing. This spreads through the highly compressed pure air in the combustion chamber. Just then a spark occurs and ignites the mixture. The pistons move out simultaneously until the exhaust ports are uncovered by the left piston. A large part of the burned gases escapes at once to the big, annular chamber surrounding these ports. Then as the pistons move a little farther the intake ports are uncovered by the other piston and a charge of pure air surges in, sweeping before it the burned gases and driving them out of the exhaust ports. By the time that the intake ports are covered by the return stroke of the piston all exhaust gas has been driven from the cylinder and nothing but pure air remains. Air is delivered to the intake ports under slight pressure imposed by a blower built into one end of the engine. Continued inward movement of the two pistons compresses the air and when the pistons are close to upper dead center a new charge of fuel is injected, a spark occurs and the cycle is repeated.

The weight per horsepower is low (1.5 pounds) because there are twice as many power strokes as in the ordinary engine. The reliability of the engine is increased because the engine is very much simpler than the usual four-cycle type in that it has no valves, although the fuel injection apparatus and the double crankshaft nullify this advantage to some extent. The engine is in perfect balance since the in and out movements of the reciprocating parts in each cylinder absolutely cancel each other. Better fuel economy is obtained because higher pressure is used, exhaust back pressure is eliminated (referring to the pressure on the exhaust stroke in a four-cycle) and because the Diesel cycle is inherently more

efficient. It is safer against fire since the air and gasoline are not mixed except within the cylinder walls.

Developing One Million Horsepower from Tidal Energy

(Continued from page 67)

industrial area of South Wales; thirdly, to the English Midlands, of which Birmingham is the most important center; and fourthly, there will be the supply of the Thames Valley and London, which is 115 miles from the power station.

A lock capable of passing the largest ocean vessels will be built near the center of the dam at the upper end of the channel into which the turbines discharge. Vessels will be towed through this channel by electric towing engines, moving on each wall of the dam, and the lock will be provided at each gate with a bascule bridge for the passage of railway trains and shipping.

The area of the deep-water basin above the dam will be 27 square miles. Along the banks will be built suitable piers, warehouses and storage yards to accommodate the shipping and freight. On the land back of the docks will be erected the various industrial plants, which, as at Niagara, will be drawn to the Severn by the prospects of cheap building sites, abundant electrical power, and good rail and shipping facilities.

A Daring Ship Design

(Continued from page 68)

mixture of one part cement to one part of crushed coke, $\frac{1}{2}$ inch and smaller, which gave a weight of 110 pounds per cubic foot exclusive of reinforcing, as compared with 150 pounds for ordinary concrete.

The thickness of shell was greater in these vessels than would ordinarily be used, because of the omission of transverse framing. Thus the concrete of the cylindrical sections is ten inches thick at the bottom and seven inches at the top. The interior surface of all oil compartments was given two coats of spar varnish, and the outer hull surface painted with a bridge cement.

The first tanker was successfully launched sideways July 24th and found to draw almost exactly the calculated amount of water. The second tanker will be ready for launching shortly.

Each vessel is 298 feet long overall, 33 feet 9 inch beam and 21 feet 10 inches deep. The full load draft will be 18 feet.

"Koka Seki" and Its Uses

"KOKA SEKI" is a variety of pumice stone which, as far as now known, reports Vice Consul H. T. Goodier of Yokohama, is only found in the small group of Nijima Islands (New Islands), which lie off the coast of the Idzu Peninsula about 90 miles south of Tokyo. Though used in Nijima from ancient times as a building material, only comparatively recently has "Koka Seki" become known commercially in Japan proper. Because of its durability, high tensile strength, and capability of resisting 1,300°C. of heat, it is suitable for boiler and furnace construction as well as inner linings of safes and the manufacture of ice chests. As it is claimed, it can be easily cut, will take a surface of paint or metal plating, and as nails can be driven in it it is thought that the uses of this material will greatly increase. It is, however, in reinforced concrete barge building in Japan that it is best known. This concrete is stated to be about 60 per cent lighter than the ordinary kind, and is said to be absolutely resistant to seepage, water erosion, or serious breakage by freezing and thawing. An estimate cost of such a reinforced concrete barge with a cargo capacity of 180 tons is given as \$6,979, or in orders of five vessels each, as \$5,982 apiece. The current prices of "Koka Seki" in Tokyo are about 1 yen (\$0.50) per cubic foot for blocks, and 33 sen (\$0.17) per cubic foot for flakes and sand.

LEGAL NOTICES

PATENTS

IF YOU HAVE AN INVENTION which you wish to patent you can write fully and freely to Munn & Co. for advice in regard to the best way of obtaining protection. Please send sketches or a model of your invention and a description of the device, explaining its operation.

All communications are strictly confidential. Our vast practice, extending over a period of seventy years, enables us in many cases to advise in regard to patentability without any expense to the client. Our Handbook on Patents is sent free on request. This explains our methods, terms, etc., in regard to Patents, Trade Marks, Foreign Patents, etc.

SCIENTIFIC AMERICAN

Contains Patent Office Notes, Decisions of interest to inventors—and particulars of recently patented inventions.

MUNN & CO., SOLICITORS OF PATENTS
Woolworth Building, NEW YORK
Tower Building, CHICAGO, ILL.
Scientific American Building, WASHINGTON, D. C.
Hobart Building, SAN FRANCISCO, CAL.

Annual Subscription Rates Scientific American Publications

Scientific American (established 1845) one year \$6.00
Scientific American Monthly (established 1876) one year \$7.00
Postage prepaid in United States and possessions, Mexico, Cuba and Panama.
Foreign Postage
Scientific American \$1.50 per year additional.
Scientific American Monthly 72c per year additional.
Canadian Postage
Scientific American 75c per year additional.
Scientific American Monthly 36c per year additional.
The combined subscription rates and rates to foreign countries, including Canada, will be furnished upon application.
Remit by postal or express money order, bank draft or check.

Classified Advertisements

Advertising in this column is \$1.00 a line. No less than five nor more than 12 lines accepted. Count seven words to the line. All orders must be accompanied by a remittance.

BUSINESS OPPORTUNITY

SUBSTANTIAL manufacturing corporation wants capable men to establish branch and manage salesmen. \$300 to \$2000 necessary. Will allow expenses to Baltimore as explained. Address, Mr. Clemmer, 603 N. Eutaw St., Baltimore, Md.

FOR SALE

CANADIAN Patent Rights on eccentric boring chuck for sale.
W. F. MYERS COMPANY
Bedford, Indiana

HELP WANTED

PATENT Office Draftsman. State experience and salary desired. Munn & Co., 233 Broadway, New York City.

INCORPORATION IN ARIZONA

COMPLETED in 1 day. Any capitalization, least cost, greatest advantages. Transact business anywhere. Laws, By-Laws and forms free. Stoddard Incorporating Co., 8-G, Phoenix, Ariz.

JEWELRY REPAIRING

WATCHES and Jewelry repaired by experts. Prompt service. Low prices; perfect work. Satisfaction guaranteed. Send by registered mail. We will write you cost. Property returned immediately if price not acceptable. Send Turpin & Sons, 118 Stapleton, New York City.

PATENT FOR SALE

MIXING VALVE for sinks, baths, one handle. Weight 1 1/2 lbs. Retail \$3.00. Mass production. Box 123, Scientific American.

WANTED

1500 RAILWAY TRAFFIC INSPECTORS; no experience; train for this profession thru spare-time study; easy terms; \$10 to \$200 monthly and expenses guaranteed, or money back. Outdoors; local or traveling; under big men who reward ability. Get Free Booklet G-42. Stand. Business Training Inst., Buffalo, N. Y.

WANTED

THE exclusive manufacturing rights of some machine, device, or article in the metal line patented or otherwise, by one of the most completely equipped manufacturing plants in Indiana. Address W. F. M., P. O. Box No. 263, Bedford, Indiana.

WANTED

AGENTS, \$60 to \$200 A Week, Free Samples. Gold Sign Letters for Store and Office windows: Anyone can do it. Big demand. Liberal offer to general agents. Metallic Letter Co., 431X N. Clark St., Chicago.

For Spot Cash mail false teeth, old and broken jewelry, diamonds, watches, old gold, silver, platinum, War Bonds or Stamps—anything valuable. Cash by return mail. Goods returned in 10 days if you're not satisfied. Ohio Smelting and Refining Co., 234 Lennox Bldg., Cleveland, O.

Printing Cheap
Cards, circulars, labels, book, paper, Press \$12. Larger \$35 Job press \$150. Save money. Print for others, big profit. All easy, rules sent. Write factory for press catalog. TYPE, cards, etc. THE PRESS CO., D-22, Meriden, Conn.