

## 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.

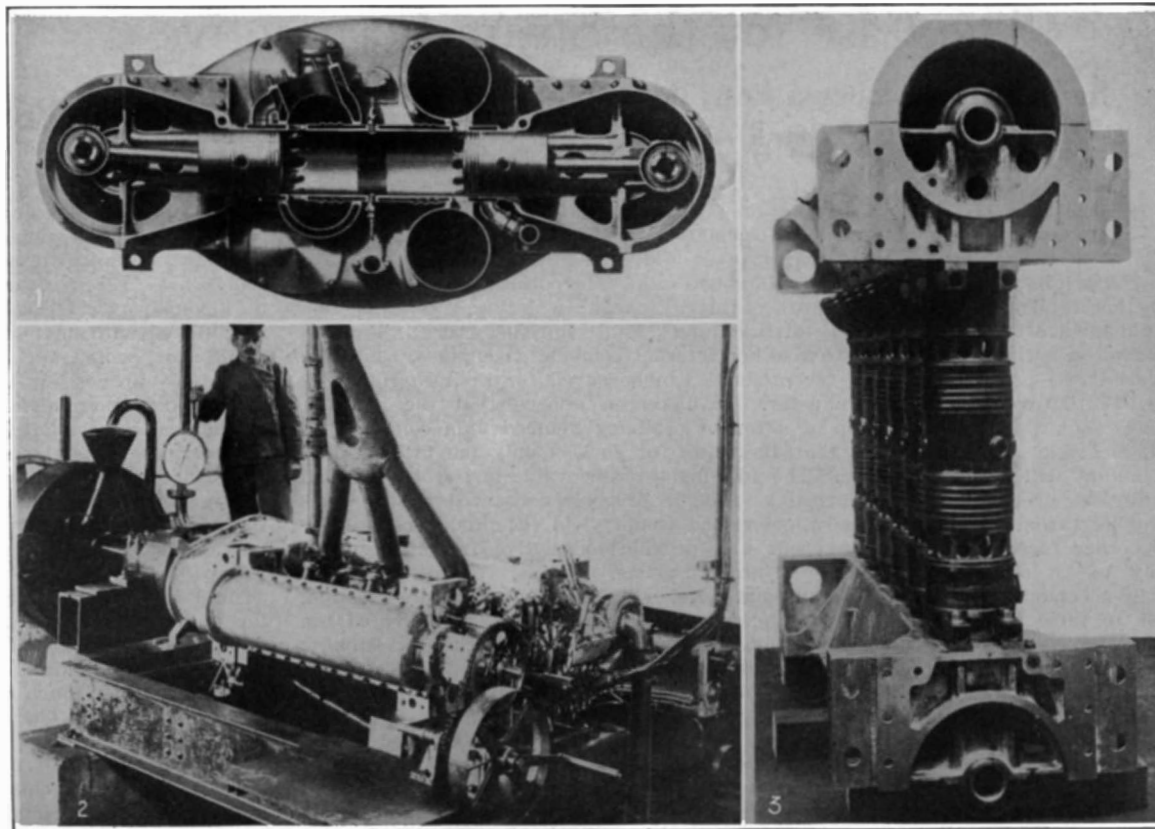
Without any intention to underestimate the elevator, it should be plain that much might be saved if every story could, in effect, be just as accessible to the motor vehicle as the ground floor, and this without the help of the freight lift. Why not make it practicable for trucks and delivery cars to 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

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)



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

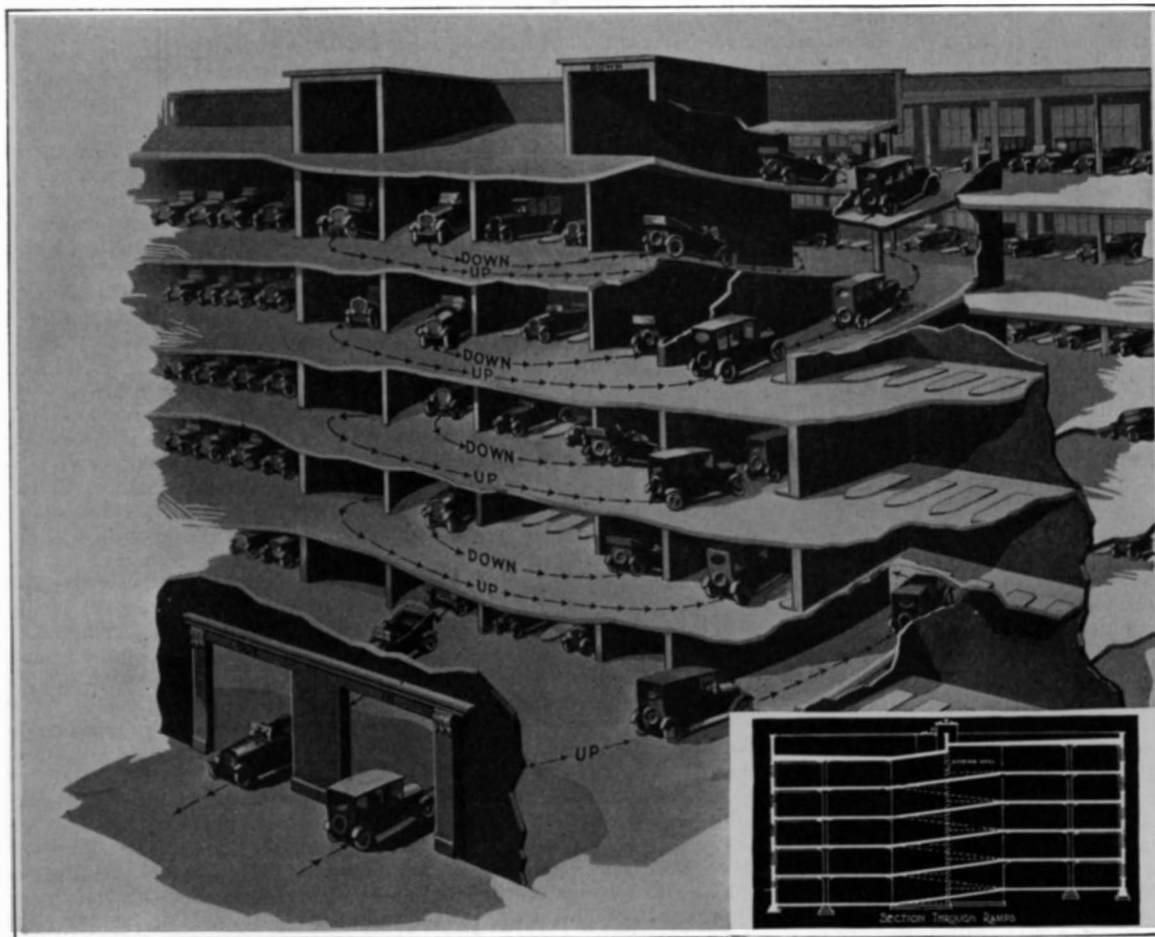
moment the air is so hot that the fuel immediately takes fire. "Throttling" of the engine is obtained by varying the quantity of fuel delivered. The injection of the fuel, by the way, occurs in the instant just before the piston reaches top dead center. The fuel is immediately vaporized by the excessively 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)



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.

### Paper From Alaska

(Continued from page 64)

problems and several methods of logging would likely be used on the same general operation.

In 1918 \$8.95 was the average cost for raw pulpwood at the mills in California, Oregon and Washington. It is believed that pulpwood can be produced much cheaper in Alaska, as the bulk of the wood will be cut within less than a mile of the water's edge. Figures of \$4 to \$6 per cord would normally approximate average conditions even under present primitive methods of logging.

Construction from the ground up summarizes the requirements to be met in Alaska, which is still a comparatively raw and undeveloped country. Following the acquisition of the timber and source of power, the mill site and town could then be advantageously located. The site would need to be cleared before construction could begin. A sawmill would no doubt be required and the first logging would be for the clearing of a mill and town site, and the building of necessary structures, such as wharves, storehouses, mills, dwelling houses, offices, machine shops and stores.

The mainland and islands of southeastern Alaska are generally mountainous, and there is little level land either as upland area or along the shores. Along much of the coast line the hills and mountains rise abruptly and the dense forest growth, extending down to the level of high tide, overhangs the steep banks. The islands are separated by an intricate system of waterways and fiords, known locally as straits, canals, channels, passages, sounds, narrows, inlets, bays, coves and arms, some of which reach far inland. Many of these waterways are very deep and can be safely navigated by the largest ocean steamers, but some are so shallow as to be navigable only at high tide by boats of moderate draft. The coast and entrances to harbors are rocky and in places the greatest care is necessary in order to avoid rocks that are barely submerged. The topography is so rough that only in favored localities or at great expense can wagon or tram roads be constructed. The waterways are, therefore, of great value in affording routes of communication between this region and the Pacific Coast ports of the United States. Indeed, were it not for water transportation the mining and quarrying industries in southeastern Alaska could scarcely have been developed. Fortunately the timber which would be used is situated along the coast and on the large islands of southeastern Alaska and as previously stated, on the Tongass National Forest.

### Every Automobile Its Own Elevator

(Continued from page 65)

ing stories, it is generally necessary to alternate their positions from floor to floor in order to give the ascending and descending cars ample space in which to maneuver in leaving one ramp and in approaching another. This arrangement takes up a good deal of valuable space and, besides, is apt to impose architectural difficulties and to call for a disposition of piping for heating, drainage, water supply, etc., which is much more complex than where the leads are alike on every floor.

Nevertheless, the ramp is desirable, for it promotes rapid travel up and down through the building and the freest movement to and from the street. Further than that, where numerous cars or trucks are concerned, congestion of traffic in front of the structure is reduced to a minimum. But the present and the steadily rising price of real estate, especially in populous and busy centers, makes it imperative that the warehouseman, the manufacturer, the storekeeper, and the garage operator, shall get the fullest returns for every square foot of floor space,

and thus reduce the overhead charges as far as possible. And now we come to a type of ramp that constitutes a novel and a very valuable development in the art: one that has all of the virtues of the usual ramp with worth while characteristics peculiar to itself. It is the invention of Fernand E. d'Humy, an experienced American engineer, who was inspired primarily to better the housing facilities offered by the run of city garages. His problem was to evolve a modified form of ramp and a type of structure to go with it which would abridge the inter-floor rise and, therefore, the length of the ramp. His scheme, as now evolved, permits the use of his motor ramps in tall buildings of many stories.

Broadly, the fundamental plan calls for a structure divided longitudinally or transversely into two sections by a central wall, with the floors of the neighboring divisions staggered or half a story apart. Manifestly, a motor vehicle, passing through the dividing wall, on the ramp, would have only half a story to climb or to descend in going from one floor to the other. Therefore, the ramps themselves need not be more than 40 feet long with a maximum gradient not exceeding 15 per cent. Horizontal space is economized by giving the ramps a curve, which incidentally makes it easier to control a descending car and to swing it into the next ramp unit. Accordingly, one complete turn on the ramp suffices to carry the vehicle a whole story upward or downward on either side of the dividing wall.

Compared with a number of recent garages equipped with the ordinary ramp construction, the d'Humy motor ramp makes it possible to house on the same floor area from seven to twenty additional cars. But this does not cover all of the material advantages. The d'Humy motor ramp can be placed in the center of a building, where it will in no wise interfere with natural lighting, and therefore leaves the best illuminated sections for the storage and the overhauling of the machines. Next, a matter of vital concern, the cars or trucks can move in or out freely in a continuous stream, either to meet the rush-hour service period or to take care of them when they are home-bound in large numbers. Where conditions justify it, duplex concentric ramps or separate twin ramps would be provided to take care of the vehicular tide—one line for the up-bound and the other for the down-bound traffic.

It will be observed that there are no moving features, and neither electric current nor operators are required to make the ramps themselves available. It is estimated that the working charges for the elevators of a 5-story garage, capable of housing 400 cars, would total quite \$4,380 yearly; and none of the trucks or cars could be got out of the building or stored if the power supply failed. Picture the risks run if fire threatened from a near-by building aflame! With the d'Humy structure, on the other hand, however high, all of the cars ready to be driven could be removed in short order, and it is quite likely that those with empty fuel tanks could coast down and get out of harm's way.

What applies to the garage is equally true of the factory, the warehouse, the great department store, etc. No matter on what floor are located the goods to be shipped or on what level incoming materials are to be delivered, the motor ramp enables the automotive truck or car to get there with dispatch and under its own power. In many manufacturing establishments of magnitude, raw materials as well as finished and partly finished products are moved about on the several floors by electrically-driven industrial tractors hauling strings of trailers. But when a train of these helpful carriers has to go up or down to other floors it is necessary to break up the train and

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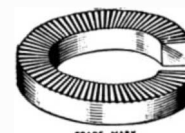
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(Continued from page 75)

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.

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