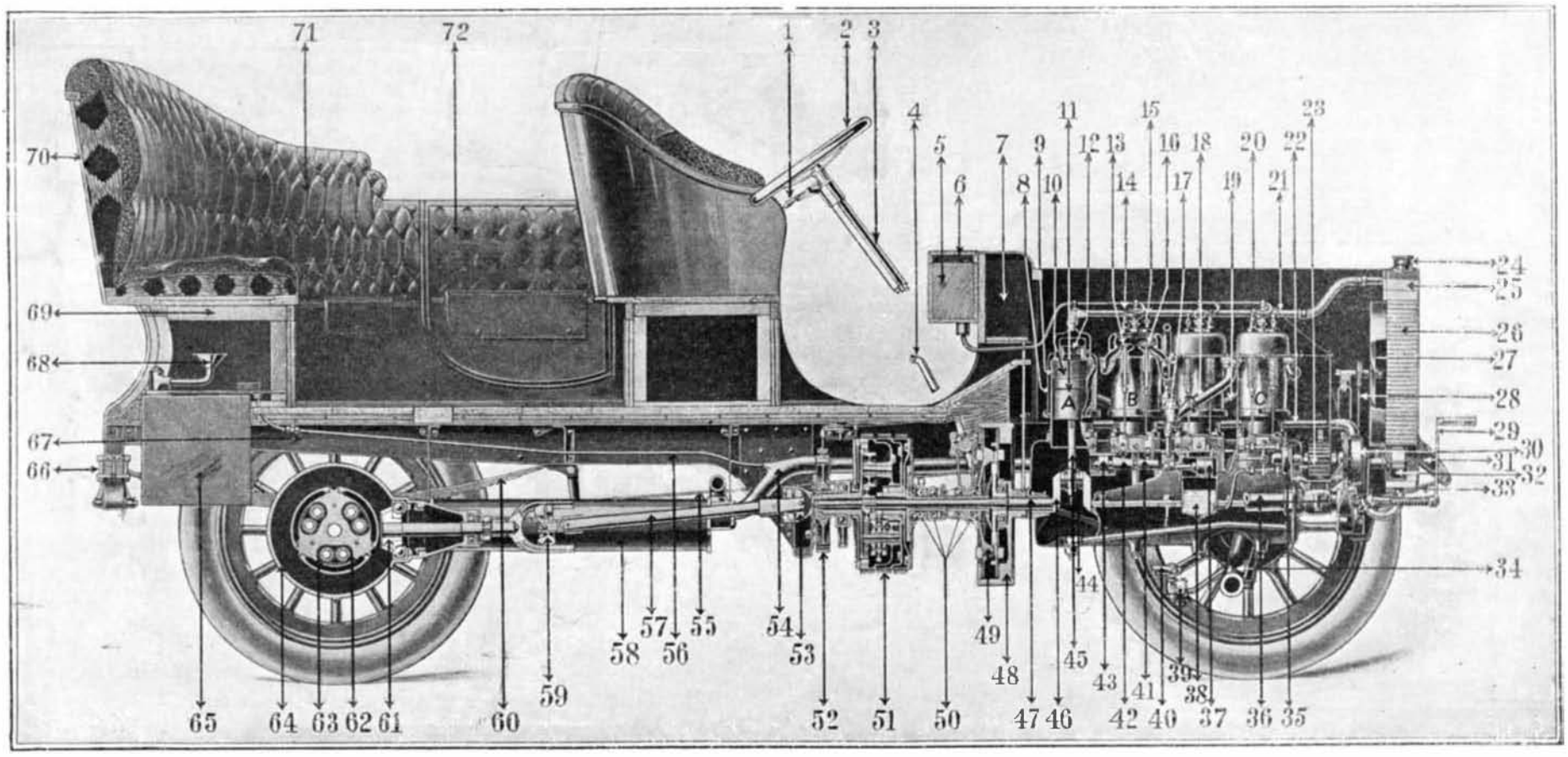
A TYPICAL AMERICAN TOURING CAR.

The annexed sectional cut shows in considerable detail the mechanism of a gasoline touring car of distinctively American type. From the manufacture of a single-cylinder runabout and light tonneau, the makers of the Cadillac machines have risen to the construction of the huge car seen below. In doing this, however, they have wisely retained features which contributed largely to the success of the smaller models, and at the same time added several novel improvements. Thus we see on the touring car engine copper water jackets, variable-lift mechanically-operated inlet valves, and the same floatless atomizer or mixer that have been used heretofore; while a distinct novelty for a car of this kind is the employment of a planetary transmission gear which, in connection with a clutch in the flywheel, gives three speeds forward with a direct through drive on the third, or high speed. The special form of three-speed planetary gear for the large touring car was developed from the two-speed gear of the smaller machines by the addition of only one moving part. As is well known, this transmission is well adapted for continuous heavy pulling, because it has no high-speed parts and its gears are subjected to lower tooth strains, size for size, than those of any other common type of transmission. With this type of transmission it is possible to pass instantly from one speed to another by simply pushing a lever. The telescopic universal joint, 59, is to be noted. The car has a spur-gear differential and bevel driving pinion, 61, which can be readily adjusted from the outside. The main rear axle is a solid tube having ball bearings on each end for the wheels. The live axle extends through these, and drives them by means of jaw clutches that lock it to the outside face of the hubs. The car has long, heavy springs, besides a transverse spring at the back. Its wheels are shod with 34 x 4½-inch tires, and it has a wheel base of 100 inches, while the length of the frame itself is over 12 feet. The weight complete is in the neighborhood of 2,600 pounds. The 4⅜ x 5-inch engine is rated at 30 horse-power, and it is capable of driving the machine at a rate of speed of 50 miles an hour.

Altogether this car is a good example of that simplicity of construction that is aimed at by almost all American builders.



LONGITUDINAL SECTIONAL VIEW OF A FOUR-CYLINDER GASOLINE TOURING CAR OF DISTINCTIVELY AMERICAN DESIGN.

1, Throttle lever; 2, steering wheel; 3, steering column; 4, clutch and brake pedal; 5, spark coil: 6, vibrator; 7, 5-gallon gasoline tank for supplying carbureter by gravity; 8, copper water jacket; 9, cylinder wall; 10, piston rings; 11, piston and oil groove; 12, compression chamber; 13, inlet valve; 14, spark plug; 15, relief cock; 16, exhaust valve; 17, carbureter; 18, inlet pipe; 19, exhaust pipe; 20, bonnet; 21, 22, water pipes; 23, gear for driving oil pump; 24, radiator cap; 25, water tank; 26, radiator; 27, radiator fan; 28, chain for driving fan; 29, starting crank; 30, centrifugal water pump; 31, spring banger; 32, commutator; 33, front spring; 34, tubular axle; 35, oil pump for governing device; 36, tubular sub-frame supporting engine; 37, piston of oil governor; 38, reserve oil chamber of governor; 39, rod connecting steering levers of front wheels; 40, connection to steering column; 41, exhaust valve cam; 42, variable inlet valve cam; 43, bearing for slidable cam shaft; 44, 45, connecting rod and crank; 46, crank cheek; 47, crankshaft; 48, flywheel; 49, double-faced expanding clutch in flywheel; 50, ball bearings of transmission shaft; 51, planetary transmission giving three speeds ahead and one reverse; 52, double-acting transmission brake; 53, universal joint of driving shaft; 54, exhaust pipe; 55, brake rod; 56, pressure pipe from exhaust pipe to gasoline tank; 57, universally-jointed driving shaft; 58, muffler; 59, slidable universal joint; 60, rear spring; 61, bevel driving pinion; 62, 63, pinions of spur gear differential; 64, differential gear casing; 65, 20-gallon gasoline tank; 66, transverse rear spring support; 67, pressed steel side frame; 68, swinging filler for gasoline tank; 69, wood frame of body; 70, aluminium body; 71, tonneau; 72, side entrance door.

A Novel System of Wireless Telegraphy.

BY DR. ALFRED GRADENWITZ.

Our readers will doubtless remember the beautiful experiments in wireless telephony which were made by Herr F. Ruhmer on the Wannsee Lake, near Berlin, last year and continued with increasing success in the course of last summer. Now the inventor has applied his process to optical telegraphy.

In optical telegraphy the rays issuing from a projector are, as a rule, intercepted at given intervals, so as to form luminous flashes, succeeding one another more or less rapidly. In the Ruhmer telegraph system, on the contrary, the so-called speaking arcs are utilized by superposing on the direct current circuit of the lamp placed at the sending station in the focus of a projector, a continuous current frequently broken by means of a mechanical interrupter, the opening and closing being insured by a Morse key, in accordance with ordinary Morse signals. At each closing of the telegraph key, the superposed and frequently interrupted current will modify the luminous intensity emanating from the electric arc, giving rise to luminous oscillations which are projected toward the receiving station. If all the conditions be so arranged that the luminous intensity of the lamp is maintained constant, this process will insure not only a more rapid handling of telegrams, but will permit at the same time of keeping the latter strictly secret, as the human eye, incapable of discerning any more than 10 luminous alternations per second, will get the impression of a continuous beam on account of the rapidity with which the luminous oscillations of the transmitting station will succeed each other.

The receiving station is arranged in a way analogous to those of optical telephony, comprising two telephones and one parabolic reflector in the focus of which the selenium cell is placed. The luminous oscillations of the transmitting station act on the selenium cell at the receiving station to alter the resistance of the electric circuit through the telephones, thereby producing intermittent humming sounds which vary with intervals corresponding to those of Morse signals. The pitch of this sound will depend on the frequency of the interrupter. Whereas in transmitting language, uncertainties are possible on account of the different acoustical intensities of the different vowels, the same sounds have to be heard here for more or less prolonged intervals. It has therefore been possible to insure perfectly clear transmissions of signals in atmospheric conditions which would have rendered difficult the transmission of language. The beginning of a communication is indicated by a bell, operated by the selenium cell without the agency of any wire connecting it with the transmitting station.

The satisfactory results of the experiments so far made, go to show that this system of optical telegraphy, like the analogous system of optical telephony, will be used to special advantage in the case of transmissions over short distances.

A Prize for Cement Essays.

Prizes to the value of 15,000 marks are being offered conjointly by the Prussian government and the German Society of Portland Cement Manufacturers for essays on the processes which take place during the hardening of hydraulic cements. The following questions are those offered for investigation, any or all of which may be taken by the competitor: Demonstration of the properties and of the hardening process of calcareous hydraulic cements, synthetically, analytically, microsopically, mineralogically (hardening in air, fresh water, and sea water). (a) To prove whether silicic acid, alumina, and oxide of iron combine with lime as crystalloids in stable proportions, or as colloids in varying proportions. (b) To prove whether double combinations result between silicic acid, alumina, and oxide of iron with lime, and in what manner these substances are engaged in the hardening process. (c) Consideration of the swelling phenomenon which accompanies the hydraulic hardening. (d) Consideration of the influence of the temperature and length of time of the burning process on the different kinds of hydraulic cements. (e) Properties of puzzolana and its hardening with lime; beginning with silicic acid as the most active and prevailing puzzolana, alumina, oxide of iron, and manganese, independently and in combination with silicic acid, either as natural or artificial puzzolana. The papers must be written in German and submitted under a *nom de plume* to the Ministry of Public Works, 80, Wilhelmstrasse, Berlin, on or before December 31, 1906. The papers will be adjudicated by a committee comprising Profs. Van't Hoff, Schiebe, and Fresenius, Drs. Michaelis and H. Passow, and Messrs. E. Crammer and F. Schott, and officials of the Royal Testing Station, Berlin.

gears are always in mesh, and there is no chance of stripping them from bad manipulation.

The engine is governed by varying the lift of the inlet valves. This is accomplished by sliding the camshaft (the inlet-valve cams of which are tapered) bodily lengthwise and thus bringing the lower part of the inlet cam, 42, beneath the roller of the inlet-valve stem, 13. The result is the valve does not open so much and the engine is throttled. The camshaft is slid by means of a piston, 37, moved in a cylinder by oil pumped by a rotary gear pump, 35. The camshaft is set for maximum lift normally, and held in this position by a spring. When a by-pass controlled by the throttle lever, 1, is opened, oil is drawn from the reservoir, 38, and pumped against the oil piston, thus forcing it, its rod, and the camshaft as well lengthwise against the spring. This is a simple device, which has been found to work well in practice. The lubrication of the engine is entirely by splash, only one sight-feed, supplied by a mechanical oiler, being used. A series of inclined troughs on the inside walls of the crankcase carry the oil from one end of the motor to the other and back, while curved oil pipes on each crank box pick up oil and conduct it to the bearings. The commutator is placed in a hole at the base of the radiator. The jump-spark system with coils having vibrators and with batteries as a current source, is used. A gear-driven centrifugal pump circulates the water. Ball bearings are used throughout, and a special form of