

# A SUCCESSFUL FARM MOTOR.

## THE AUTOMOBILE ADAPTED TO AGRICULTURE.

BY C. M. EASON.

THE most conspicuous features of this machine, which has been named the Autotractor by its inventor, Ansel S. Wyson, are its light weight, ease of control, and simplicity. These are made possible by the use of a very effective system of chain transmission, together with a very simple engine carrying the friction clutch and sprocket bearings on its crank-base casting, and a steering arrangement somewhat similar to that used in automobiles.

There have been several models of the autotractor built during the past three years, and a larger machine is now under construction, which is expected to produce better results than its predecessors. In various tests both in plowing and harvesting the autotractor has been found to be more economical than either horse or steam power. Practically any liquid fuel may be used, and there is no limit to the uses to which it may be put, from threshing grain to pumping water. The Topeka Foundry and Machine Company are builders.

The 6-horse-power machine shown with 6-foot binder was the first successful model built, and it was followed by a 15-horse-power machine.

On the road the autotractor is well adapted to all kinds of freighting and general road work, and has advantages over the steam traction engine, for there is no fireman, no coal wagon and driver, and no water wagon. This last is a big advantage. Under average conditions the saving effected by the autotractor will amount to from 30 to 50 per cent of the cost of operating a steamer.

The difficulty of slipping has been overcome by the use of sharp lugs on the wheels, and by so balancing the machine that when under load practically all of the weight is carried by the drive wheels. The machine shown in the illustration pulled six heavy moldboard sod plows four inches deep in dry buffalo sod in western Kansas, which is a heavy load for twenty horses, this type of plow being of heavier draft than those used with horses. The wheels held perfectly except in "wallows" or muddy spots. Although a heavy load may be pulled on good ground, it is more effective to pull a few plows at a high rate of speed, with special moldboards, if necessary, thus giving plenty of traction to cross mud or sandy spots, where the machine is in the slippery ground while the plows are still cutting firm soil.

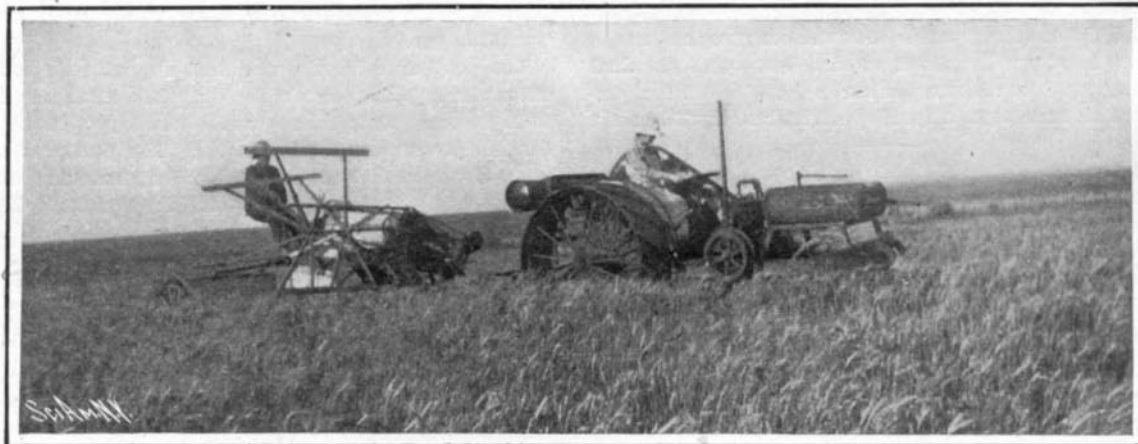
The large autotractor now under construction will combine the main features of the earlier machines with a great many improvements. Its main features are the same as those of the preceding types, with the exception of the differential gear, which is so made that by changing a sprocket the balance will be thrown to any position on the hitch beam, thus allowing the machine to stay on the hard ground, even when pulling subsoil plows, while with the ordinary arrangement the balance of power is always at the center of the beam, making it necessary to pull plows which will turn as much as the width of the machine or to run one wheel of the traction engine on the plowed land, which makes effective work impossible.

In the accompanying sketch the engine is shown

with the air passage. Beginning with the suction stroke of cylinder A, the air passage between the cylinders is filled with combustible mixture. Cylinder A draws this mixture back into its compression space, while pure air follows through the valve at intake

above the canopy to the carbureter through a thin 4-inch tube.

The exhaust is taken from the two firing cylinders into a cast-iron manifold, which holds a 5-inch casing, into which is set the exhaust pipe. This pipe has



A SIX-HORSE-POWER MACHINE WITH A SIX-FOOT BINDER HAS CUT AND BOUND TWELVE ACRES OF WHEAT IN FIVE HOURS.

port of cylinder B, filling the air chamber. The valve from carbureter, being of equal spring tension and capacity, admits an equal amount of mixture to cylinder A, which is then fully charged with the firing mixture. Cylinder A now compresses the gas in its chamber and the air in the passage to about 15 pounds per inch, when the piston in cylinder B opens the intake port C, Fig. 2, which allows the pure air from the passage to rush through cylinder B, blowing the burned gas out through the exhaust port, and followed by the gas mixture, which fills cylinder B, and is compressed and burned in the usual way, when the cycle is repeated.

The capacity of cylinder A is equal to that of cylinder B plus the amount of air to be used in blowing the gas from the cylinder B.

The pure-air pipe and the carbureter are joined to the supply pipe, which takes all the air used from above the canopy.

The connecting rods are of manganese bronze and divided laterally, the object of this being to reduce the strain on the bolts. The cylinders are 7 and 8½ inches by 8-inch stroke, the crank shaft 3 by 3½-inch wrist, running in bearings of Parsons white brass.

All crank-shaft bearings are on the crank-base casting. The spark timer is of red fiber mounted in a brass housing which gives it means of oscillating to time the spark. One tool steel block is set in a flange in the shaft, flush with the surface of a fiber ring. Two contact brushes are held against this ring by the fiber block in the brass housing. The whole timer is self-contained, being made very large to resist wear, and having no small or delicate parts to get out of order. Connection is made to the steering post in

sawed slits extending over the portion inside the casing, and is carried up through the canopy, where it is again slotted to silence the exhaust.

Lubrication is effected by a bank oiler located on the radiator, where it is kept at practically the same temperature in hot or cold weather. The pistons are oiled directly from the oiler, and the cranks by splash. There being no mechanically-operated valves, the problem of lubrication is very simple, the bank feeding only four tubes. Large handhole plates are provided for the inspection of connecting rods and bearings, and all parts are made as accessible as possible.

After a good deal of experimenting the form of radiator adopted is that shown in the photograph of the large machine, and consists of a steel tank mounted on the front of the machine over the steering wheel, and filled with tubes, there being ninety tubes of 2 inches diameter by 4 feet in length. Through the center of the tank runs a shaft, upon which are mounted two fans, one at either end of the tank, the circulating pump, and the drive pulley, which is at the opposite end of the tank from the pump.

The circulating pump is of large diameter, and is a plain centrifugal type, running in either direction. The pump is designed to draw water from ponds or tanks for filling the water tank at the rear, and is provided with a special valve which connects the piping for filling the tanks, drawing the water from tank to radiator, or for circulation through the cylinders.

The autotractor is provided with two clutches, one for belt drive and one for transmission to chain gearing, which takes power from the heavy flywheel and transmits to the sprocket through a sleeve over main shaft. This clutch is two-jawed, carrying a wooden face for friction surface, and acts on the inside face of flywheel. By this system the machine can be jerked out of holes by the momentum of the flywheel, without shock to the engine and shaft. On the pulley end of the shaft there is mounted a light flywheel, outside of which is an ordinary gas-engine friction-clutch pulley.

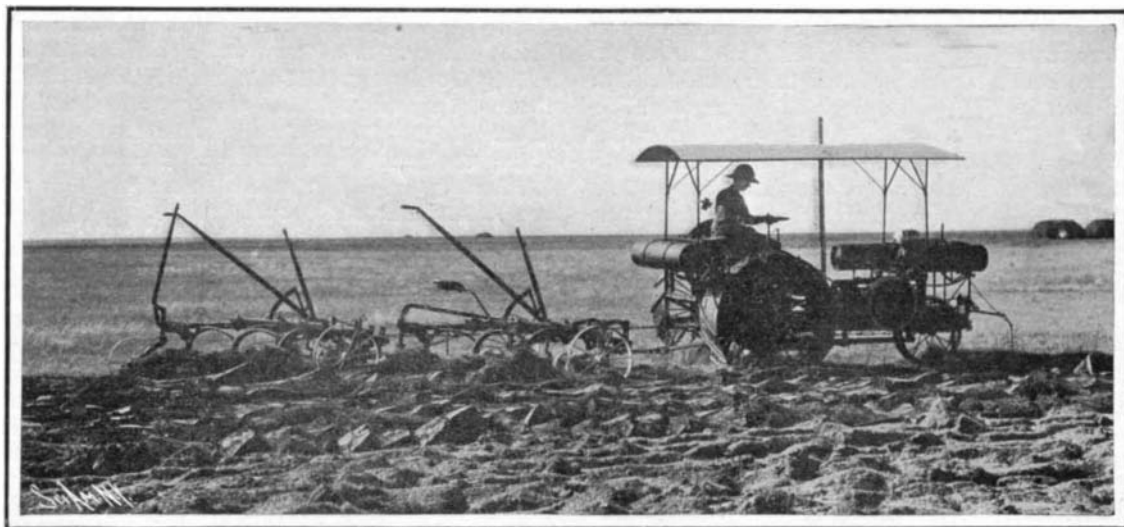
The chain transmission has been found to give good service. The chains are of the steel-roller type, of 1½ and 2-inch pitch, with a breaking strength of 50,000 pounds at the back wheels.

The countershaft is mounted on a superstructure which also carries the seat, and is fitted with a pair of steel sprocket rims of 86 and 89 teeth respectively, these rims being supported by a web of boiler plate and held apart by a light cast-iron ring through which the rims are bolted together. On the opposite side from the boiler-plate web is a thin sheet-steel web, which forms a dustproof covering for the differential gearing, which is mounted between the two webs.

The two sprocket rims correspond with the two small sprockets on the clutch sleeve and carry one chain, of 1½-inch pitch, which is thrown from one set to the other for change of speed ratio.

Upon each end of the countershaft is mounted a solid steel sprocket of 11 teeth, which corresponds with one of 69 teeth mounted on each hub of the driving wheels, and carrying chains of 2-inch pitch.

The drive wheels are 5 feet 10 inches in height, and are 36 inches in width. The tires are formed of steel plate 38 inches wide, flanged in 1 inch to stiffen each edge. The hubs are of cast iron, cored out and ribbed inside to combine lightness and strength, and



A FIFTEEN-HORSE-POWER MACHINE WITH SIX PLOWS CUTTING RIGHT FEET OF SOD AT A SPEED OF FOUR MILES AN HOUR.

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with a cross-section of one pair of cylinders, A and B, which are cast together with an air chamber between. A light valve is placed in head of cylinder A and connected with carbureter. A similar valve is placed in air chamber at intake port of cylinder B, which is balanced with the carbureter valve in head of cylinder A. Cylinder A is connected with the air chamber near the top, and is at all times in communication

the same manner as in automobile practice. The carbureter is so formed as to control the pure air as well as the mixture, and is operated by a governor which automatically prevents the engine from racing when the plows are suddenly thrown out of the ground at the end of the field. The gasoline supply is from a 70-gallon tank in the rear through a strainer and copper tubing to the carbureter. Air supply is from

carry a large sprocket web on the inner end which is held in place by studs.

From the rim of the large sprockets on the hubs are extended steel bars, which are fastened to the rim of the wheel and take all the pulling strain, thus relieving the spokes of all torsional strain.

The front wheel is made in the same manner as the drive wheels, and carries a skid band of 2½-inch T section.

#### THE MANUFACTURE OF ORGANS.\*

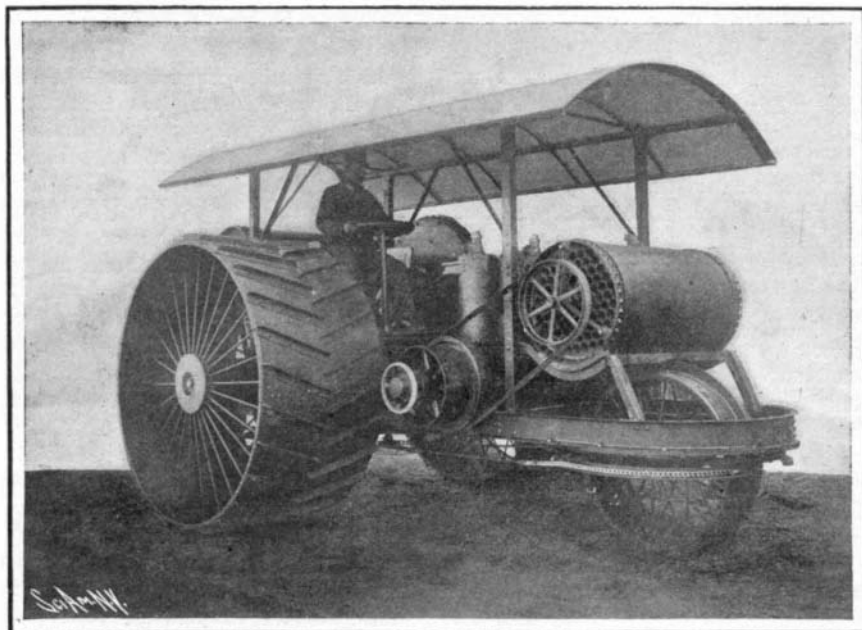
THE manufacture of the reed organ, like that of other musical instruments, is largely the result of experience and development. Probably the manipulation of the tongue of the reed to a proper size and curve and the determining of the size of the reed cells, etc., and the length and size of the qualifying cells, when such are used, are the most delicate of the intricate operations involved in its manufacture.

The vocalion is a reed organ approaching somewhat a pipe organ in its characteristic tone quality. Vocalion instruments are largely used in churches, and usually have a pedal base and often two manual claviers, or keyboards, conforming in appearance to the pipe organ. The difference between the ordinary reed organ and the vocalion is that in the latter the air current passes through qualifying cells and tubes before or after reaching the reeds.

There have also been manufactured a combination pipe and reed organ, desk and reed organ, and other somewhat unusual compound forms of the instrument. Almost all the materials used in reed organ construction are strictly American products, with the exception of ivory and ebony. Very little ivory is now used on the keyboard of reed organs, celluloid

wood being carefully selected of various growths, and the metals, chiefly zinc, tin, and lead, being used in alloys according to the different qualities of tone desired. The arranging of the shape and size of the

tion and which takes up much less room than the ordinary class of feeders, but the ordinary compound bellows is used in the majority of organs, and almost altogether in those built in 1904. The air does not

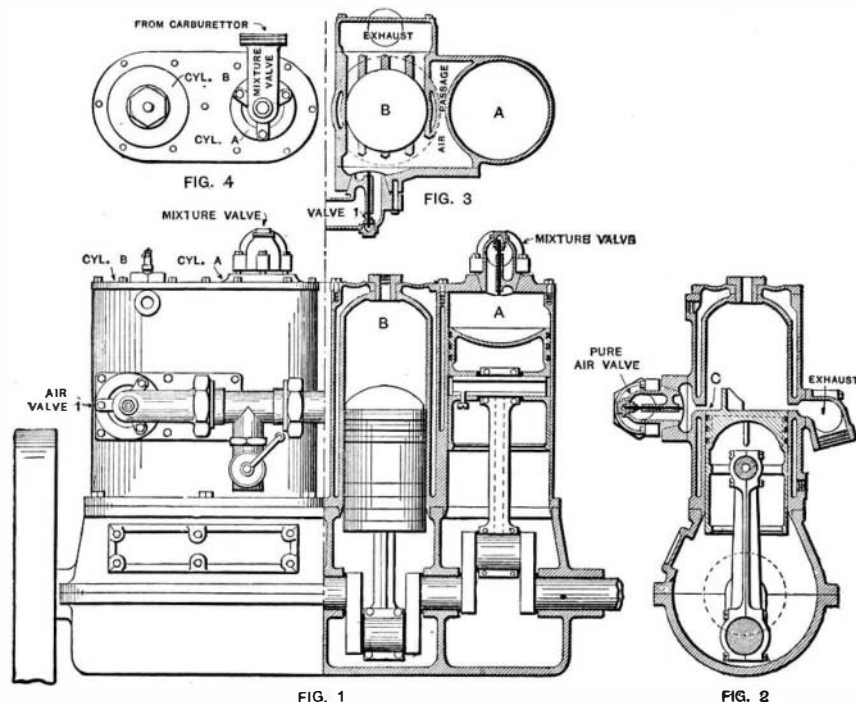


THE NEW MODEL AUTOTRATOR.

pipes is an operation in which experience and knowledge on the part of the builder are necessary to the manufacture of a successful instrument. The voicing and tuning of these pipes are invariably done before

pass directly to the pipes, but is generally led first into a regulator bellows, which makes the pressure more even and regular in strength, after which it is conveyed to the wind chest, and is then caused to pass into the pipes by the opening of valves controlled by the key or playing mechanism.

Probably the most recent development in pipe organ construction is the electric action, which is operated either by a storage battery or by a small generator connected with the bellows motive power. Depression of a key causes electrical contact, allowing the current to pass through a magnet in the wind chest or pallet box, which magnet operates a primary valve connected with a larger valve, which, being open, allows passage of air, thereby causing the pipe to speak. Each key of both manual and pedal claviers is fitted with this arrangement of magnet, air cells, valves, etc., and the action is simultaneous with the pressure on the key or pedal. The use of electricity in the action mechanism allows the instrument to be played with an even and light pressure on the keys, whereas, in the older style tracker organ, to operate some combinations required considerable strength. Another advantage in an electrically operated organ is that the key case, or console, may be placed at any distance from the organ proper, inasmuch as the power is transmitted by wires to the valve mechanism connected with the pipes. This arrangement is also possible in the tubular pneumatic organ, although the distance capable of being covered is necessarily somewhat limited.



THE AUTOTRATOR ENGINE.

being substituted in its place, while a stained wood is generally used instead of ebony for the black keys. Very little expensive veneer is used on these instruments, unless by special order, as it greatly increases the cost of the instrument. Unlike the average piano manufacturer, organ makers usually manufacture all parts of their instrument with the exception of reeds and keys, the making of which is really a separate industry.

The number of pipe organs manufactured is not great, but as a rule they are large and comparatively expensive. Their production is not centered to a very marked degree in any one State. The value of the organs produced in Massachusetts at the census of 1905 formed 24.9 per cent of the total value for the United States. Boston is one of the chief centers for the manufacture of high-grade pipe organs, 60 of these instruments having been built in this city during 1904, with a value of \$313,220, a greater valuation than was reported by any other State.

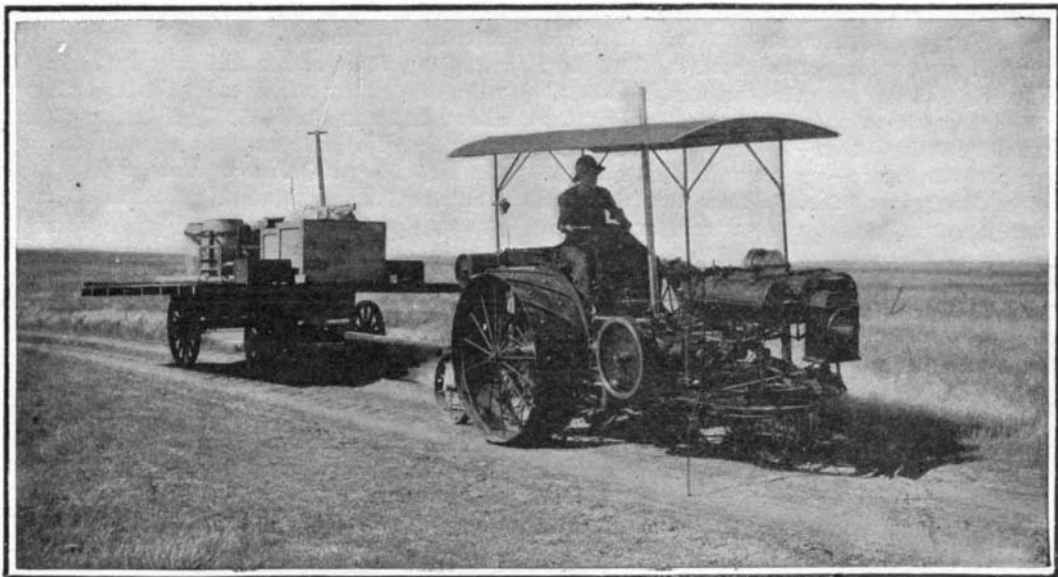
The pipe organ is often spoken of as being the largest, most expensive, and most perfect of all musical instruments, and the methods of its manufacture are of considerable interest. Almost every pipe organ is practically built to order to accord with the architecture or acoustic qualities of the room or auditorium in which it is designed to be placed. The ornamental work of the pipe organ is sometimes put in by the building contractors, who are in no way identified with the organ builders.

One complete stop of one rank of pipes in the modern organ consists of 61 notes for the manual clavier and 32 for the pedal clavier, and there are as many stops as may be desired according to the size and cost of the organ; in some instances there are 100 or more. These pipes are made of wood or metal, the

they are set up in the organ, and this operation is of great delicacy. Final tuning and regulating are done after the pipes are placed in the finished instrument.

The bellows of a pipe organ must be of exactly sufficient capacity to feed all the pipes, and therefore

In a newly patented wood-distilling apparatus the wood, contained in a crate, is lowered into a vertical retort set in a furnace, and the top of the latter is closed. Steam is passed through a "fire-screen" around the retort, and becomes superheated; it is then admitted into the upper part of the retort through a number of nozzles. The steam, along with the pro-



THE AUTOTRATOR AS A ROAD LOCOMOTIVE.  
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varies in construction according to the size of the organ. The operation of the bellows may be by hand, by hydraulic power, or by electricity, in which latter instance a current of from 100 to 200 volts in strength is necessary. There is an electric fan feeder recently patented which is said to be very successful in opera-

ducts of distillation, escapes from the bottom of the retort through a pipe. The crate is divided into upper and lower compartments by a slatted partition, under which troughs are arranged to convey the products of distillation from the upper half of the crate on to the inclined bottom of the retort.

\* Abstracted from a bulletin issued by the United States Census Bureau.