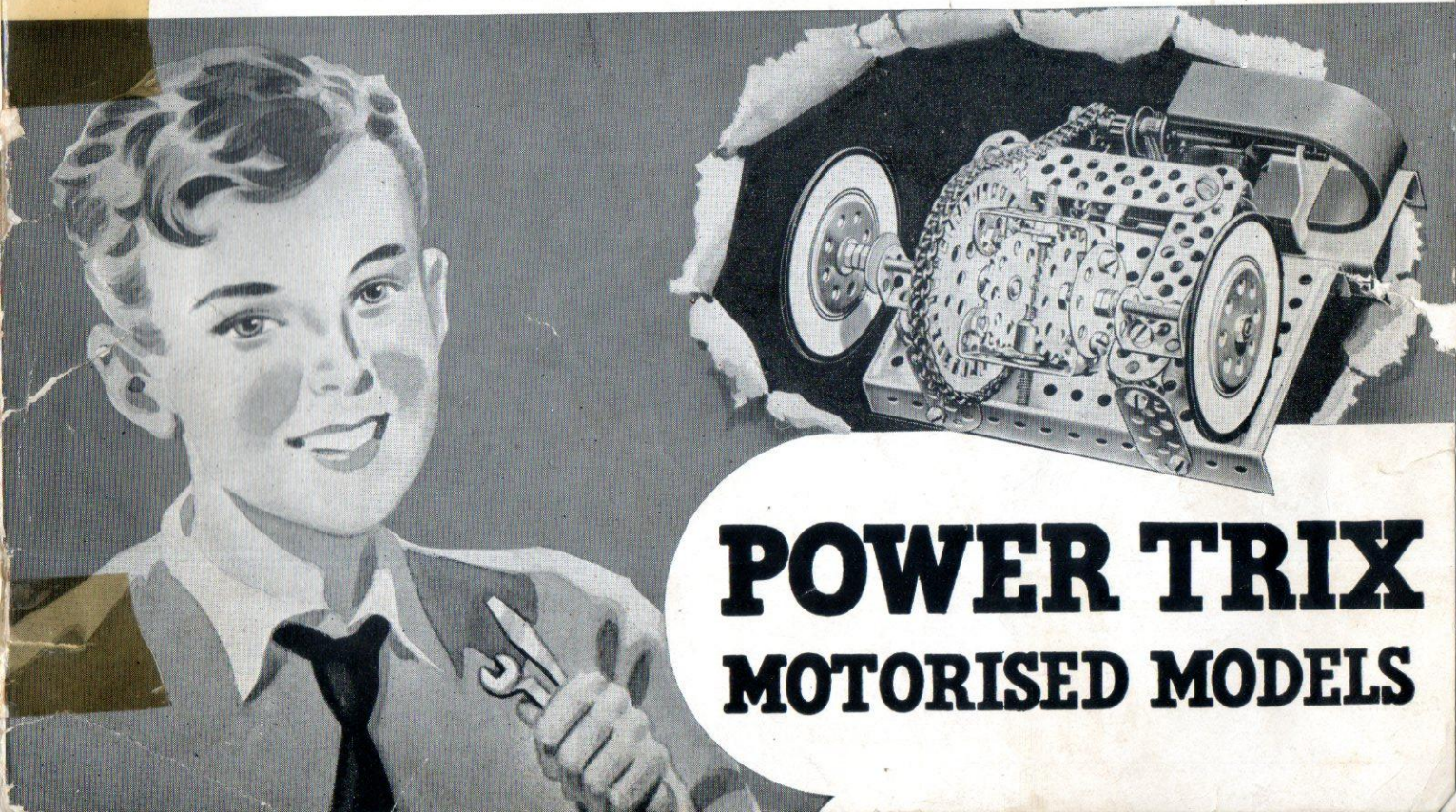
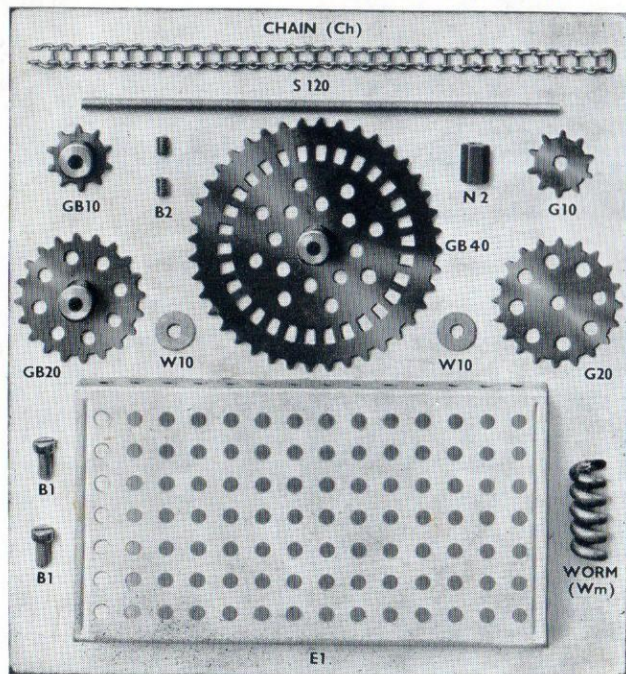


THE TRIX UNIT SYSTEM



POWER TRIX
MOTORISED MODELS

Power Trix contains one Unit A, one Unit B, one Unit G, the TRIX Permag Electric Motor, spanner and instructions.



UNIT 'G'

Parts not displayed on the centre panel are packed with the electric motor. Every component is known by a code number and as you will be referring to them constantly get to know them before you start building. For details of parts in Units 'A' and 'B' please refer to page 3 in the enclosed 48 page manual.

GEAR DRIVES

The object of a "drive" is to transmit power from one shaft to another smoothly and efficiently, without jerkiness, and with the minimum loss of power.

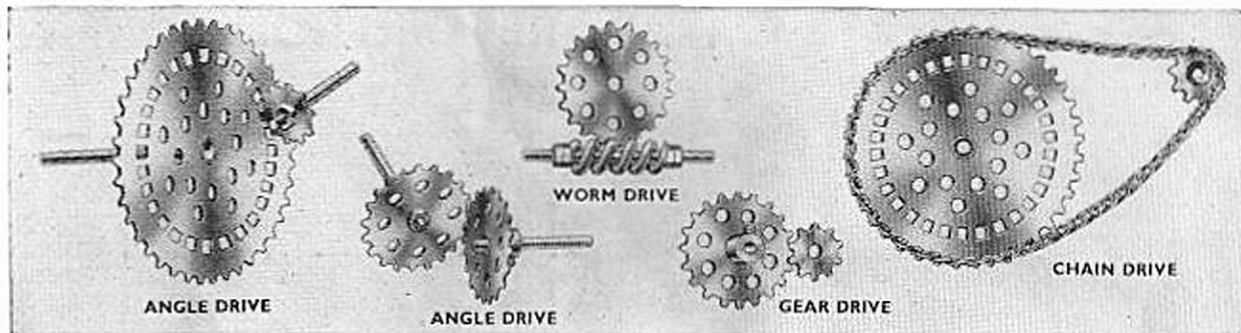
In chain drives if the sprockets are set too far apart the chain will be too tight, thus putting a heavy strain on the bearings. If the chain is too slack it may jump the sprocket.

Similarly with gears in mesh, the teeth should not bed right down into the roots of the opposing teeth; neither should they just touch at their tips. In either case wear will be rapid.

Then as to alignment—pulleys and sprockets for belt and chain drive should lie exactly in the same plane so that a straight-edge placed along them lies evenly on each surface. Test your gears when assembled by turning them lightly with the finger tip. If they bind at certain spots or skip, look for such things as a shaft accidentally bent, the framework of the model out of alignment, the motor baseplate working loose. shafts in their correct holes, etc.

HOW TO USE TRIX GEARS

With the unique tooth form the same gears are used for all gear and chain drives.



DRIVES

CHAIN—This form of drive is "positive"—it will not slip like a belt drive. Use only on vertical—not horizontal—sprockets. The ratios of drive are as for direct mesh, irrespective of the length of chains used. Thus the Permag Motor driving the 10, 20 and 40-tooth sprockets respectively will give gear ratios of 1.6, 3.3 and 6.6 to 1.

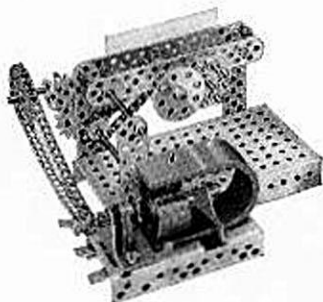
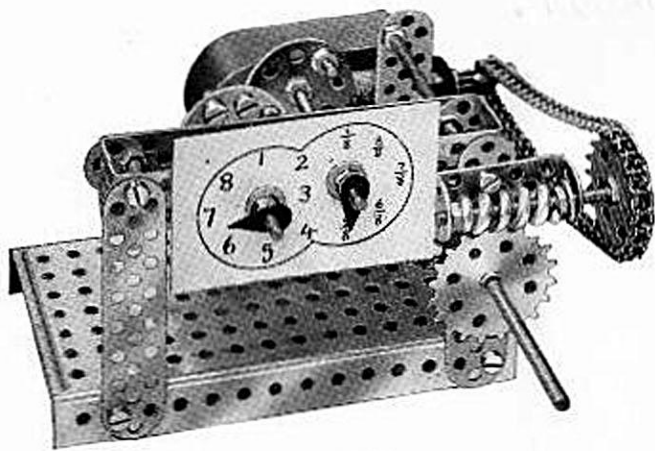
ANGLE—is similar to Spur drive except that the driving shafts are not parallel, but at an angle to each other. They should, however, lie always in the same plane whatever the angle formed between the sprocket faces. Gear ratios—1, 2, 3, and 4 to 1.

SPUR—In this case the two sprockets mesh directly. The diameters of the various sprockets are such that the holes in TRIx flat strips and girders are of the right distance apart to give correct spacing for shafts (e.g., to mesh a 40 and 20-tooth sprocket, space axles 7 holes apart on strip).

When fixing bossed sprockets on threaded spindles, do not tighten grub screws B'2s or B'1s excessively or thread of spindle will be damaged. Each wheel drives its neighbour in the opposite direction. To restore original direction interpose a third or "idler" sprocket. Ratios obtainable—1, 2, and 4 to 1.

WORM—This drive is transmitted through a right angle. It is unilateral—rotating, the worm will drive the sprocket backwards or forwards; the shaft carrying the worm cannot be driven by rotating the sprocket. Adjust worm on spindle (by means of an N1 at each end of worm) until middle of worm is immediately under centre hole of sprocket. Do not squeeze worm by excessive tightening of nuts. To keep worm in correct position use lock nuts. Worm shaft must be held against "thrust" by suitable means.

Worm gives ratios respectively of 10, 20 and 40 to 1.

POWER TRIX

Back View

REVOLUTION COUNTER

GEAR DRIVEN

SPECIFICATION

Part No.		Part No.		Part No.		Part No.	
B1	17	G10	1	N2	1	U2	1
B2	2	G20	1	P29	2	W10	3
E1	1	GB10	1	S55	4	W16	1
F9	3	GB20	1	S120	1	Wm.	1
F13	2	N1	36	U1	2	Ch.	1

Description

Used when the number of revolutions of a machine is required to be noted, for example in testing equipment where it is necessary to have a record of the work done. In our model the speed of the motor can be calculated as one revolution of the left hand pointer equals 533 revolutions of the motor. By noting the time, the revolutions per minute can easily be calculated.

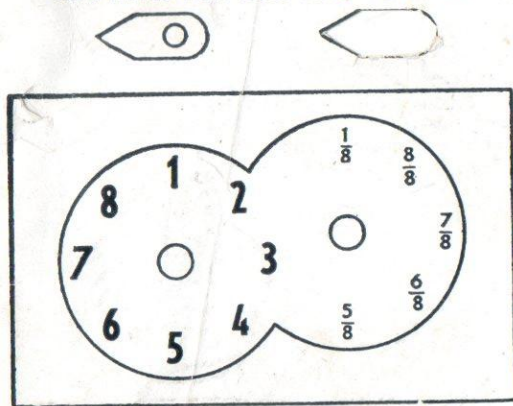
Construction

Make frame as shown from two F13's, three F9's, one U2 and two U1's. Fix to an S55, a P29 which has a N1/B1 in one of the outside holes to act as a striker for first gear. Similarly for the second gear but with 8 B1/N1 in the P29. Fit the first gear into the sixth centre hole of the F13 and the second gear in the 8th outside hole, so that the bolt

REVOLUTION COUNTER *continued*

ends on the gear wheels face each other. Make sure that the bolt ends will strike on opposite gears as the shafts revolve. Use N2 as spacer between F13 and second gear. A G10 is fixed to the S55 of the first gear, between the two F13's. Motor is attached to E1 and drives by chain a G20 fixed to an S55 which works in a U2 and carries a worm. A GB20 on S120 meshes with this worm and a GB10 fixed to this shaft drives by chain the G10 fixed to the first gear spindle. Make dial and pointers from template and fit. Note that the two pointers overlap each other when crossing the centre line of the dial.

TEMPLATES FOR DIAL AND POINTERS



CIRCULAR SAW

Description

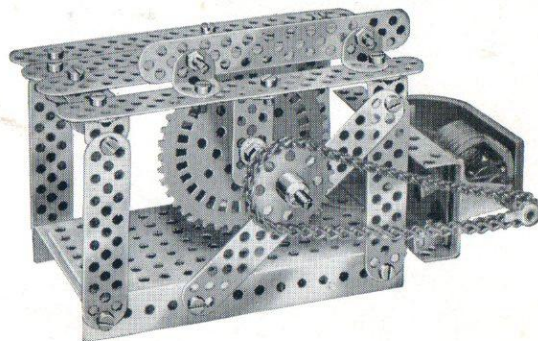
On all sawing machines the saw blades are driven by power and circular saws have as their blades circular rotating discs with teeth around the circumference.

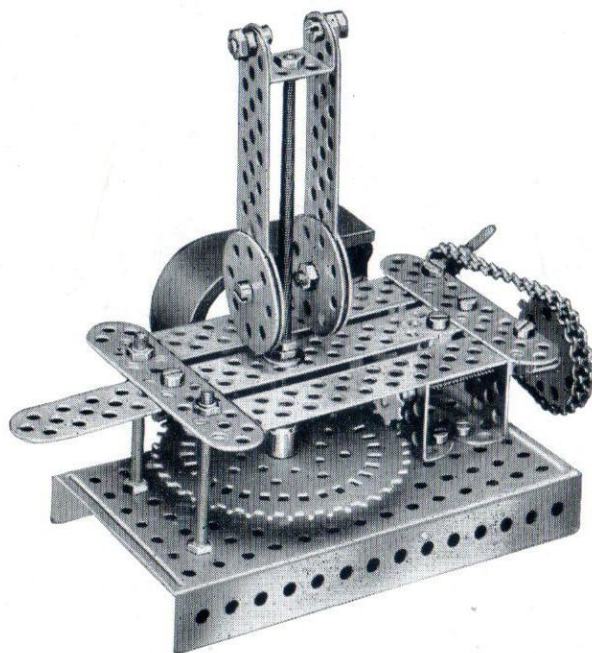
Construction

The table consists of four F17's joined by F5's which in turn are bolted to upright F9's, by two A1's and two U1's. Saw is a GB40 with S120 as spindle which works in U2's as bearings. Motor is fixed to E1 by two P29's, and drives by chain a GB20 fixed to the S120.

SPECIFICATION

Part No.		Part No.	
A1	4	GB40	1
B1	26	N1	30
B2	2	P29	2
E1	1	S120	1
F5	4	U1	2
F9	4	U2	2
F13	2	W10	2
F17	4	Ch.	1
GB20	1		





GOVERNOR

SPECIFICATION					
Part No.		Part No.		Part No.	
B1	13	G10	1	S120	1
B2	2	GB20	1	U1	1
E1	1	GB40	1	U2	2
F9	4	N1	35	W10	2
F13	2	P29	4	Ch.	1
F17	1	S55	3		

Description

The tractive force felt in your hand when a stone is rotated on a length of string is called "centrifugal force". The force used by the hand to overcome this is called "centripetal force." Using this principle, governors are used to control the speed of steam engines, and other machines.

Construction

The upper platform is made from two F13's, one F17 and two F9's and fixed to E1 by two S55's and two U2's which form bearings for an S55. This spindle carries a G10, which meshes with a GB40, and a GB20 which is driven by chain from the motor. Spindle for the GB40 is an S120 to which a U1 is fixed at the top. Governor weights F9 and P29's are loose jointed to the U1 by SCD17.*

*For details of SCD's (Standard Constructional Details) see pages 4 and 5 of the Abridged Engineering Manual.

FAN

SPECIFICATION					
Part No.		Part No.		Part No.	
A1	4	F13	2	S25	2
B1	20	F17	4	S55	2
B2	1	GB10	1	U2	2
E1	1	GB40	1	W10	3
F5	4	N1	35	Ch.	1
F9	4	P29	4	Sp.	2

Description

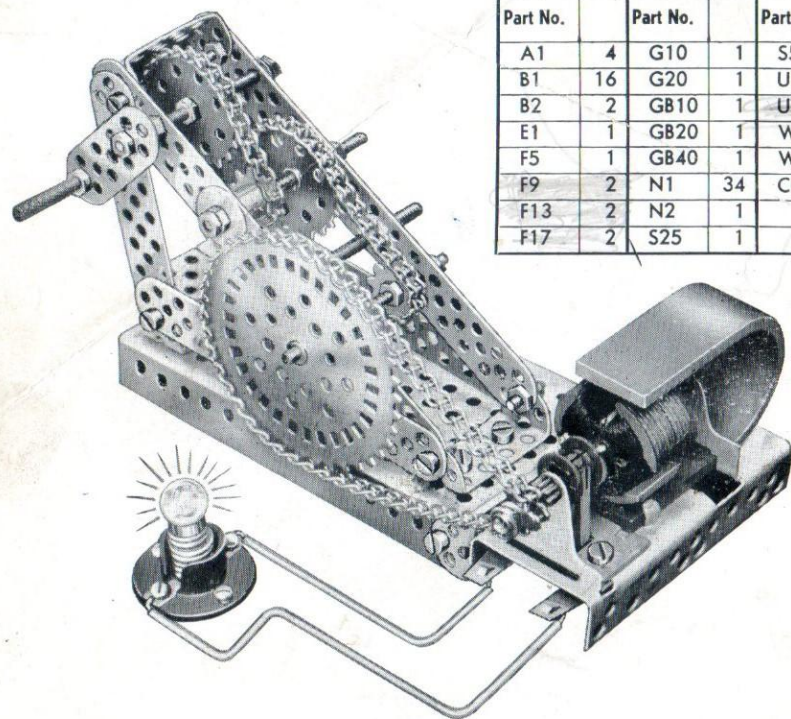
Besides the small fans we use in the home, engineers use fans for ventilating mine shafts, factories and other large buildings.

Construction

Make sides of model as shown and attach to a GB40 by A1's. This gear swivels on an S55 attached to the base E1. An F17 which slides between two spanners, spaced by W10's, is fixed to the GB40. The spanners are fixed to E1 by two S25's. The fan (three F17's) is attached to a S55 which rotates in two A1's, fixed to U2's. A GB10 fixed to this spindle is driven by chain from the motor.



POWER TRIX



SPECIFICATION

Part No.		Part No.		Part No.	
A1	4	G10	1	S55	4
B1	16	G20	1	U1	2
B2	2	GB10	1	U2	2
E1	1	GB20	1	W10	3
F5	1	GB40	1	W16	2
F9	2	N1	34	Ch.	1
F13	2	N2	1		
F17	2	S25	1		

GENERATOR

Description

An electric current is induced in the windings of the armature by its fast rotation between the poles of the permanent magnet, and this current is conveyed by the brushes and leads to light a torch bulb. This is the principle of the generators which are found in the big power houses.

Construction

The framework consists of F13's, F17's and F9's bolted to form a triangle and fixed to E1 by a U2 and A1's. Sides of frame are spaced at the top by a U2 and at base by two U1's bolted together. Further bracing of the F17's is provided by an S55.

The first spindle (S55) carries a crank (F5 and S25) and a G20 secured by nuts. This gear drives by chain a GB10 on the second spindle (S55) which also carries a GB20. This gear in turn drives a G10 on the third spindle (S55) to which a GB40 is fixed and which drives the motor. The motor is attached to the E1 by two A1's. Attach two insulated wires to the terminals of the motor and connect to a torch bulb holder. When the model is set in motion current is generated and the bulb will light.

DIFFERENTIAL GEAR

SPECIFICATION							
Part No.		Part No.		Part No.		Part No.	
A1	4	F5	4	GB10	1	P29	3
B1	18	F9	3	GB20	1	S55	3
B2	1	G10	1	GB40	1	U1	2
E1	1	G20	1	N1	34	U2	2

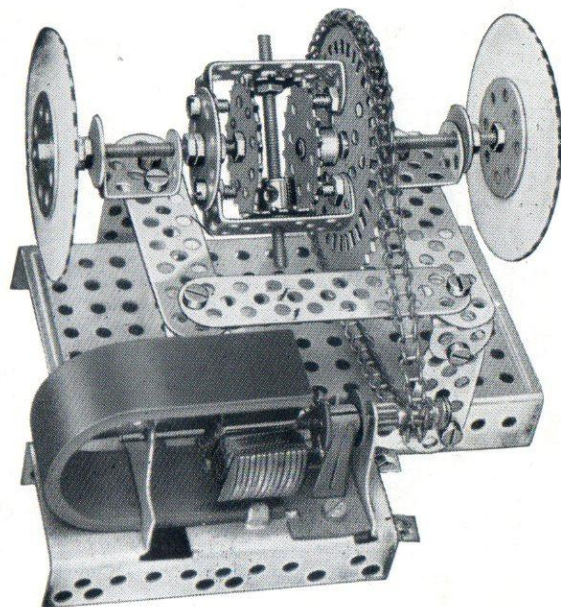
Description

This gearing is used principally in motor vehicles. Its application makes it possible for the wheel which takes the outside curve and travels the longer distance to rotate faster than the inner wheel. We can observe this in the model if we apply brake to one of the wheels in motion.

Construction

Shaft bearings (U1's) are mounted on F9's which are in turn fixed to the base by A1's and F5's. Shafts S55 run in these U1's and a frame consisting of two U2's, P29 and a GB40 is fastened between them. Inside the frame a GB20 is fixed to the shaft which passes through the GB40. A G20 is fixed to the other shaft. A spindle S55 with a G10 fixed by nuts runs through the middle holes of the U2s. This gears with the GB20 and G20 while a GB10, placed loosely on the spindle at the other end, gears in a similar way. Note the W10 between this GB10 and the U2, which keeps the gears in mesh. Bolt the motor to E1 with driving sprocket in line with the GB40.

In our model wheels are represented by discs of card $2\frac{1}{2}$ ins. in diameter. Tyred wheels can be added by using the V35's contained in the Unit C and small tyres in the Unit F.





STIRRER

SPECIFICATION

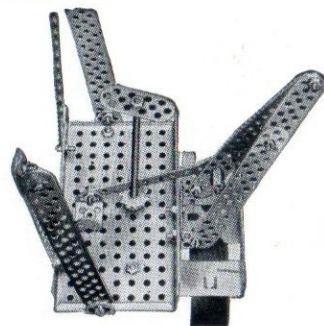
Part No.		Part No.		Part No.		Part No.		Part No.	
A1	4	F9	4	G20	1	S120	1	Ch.	1
B1	23	F13	2	N1	36	U1	2	Sp.	1
B2	2	F17	4	N2	1	U2	2	Wm.	1
E1	1	GB10	1	S25	2	W10	2		
F5	3	GB20	1	S55	1	W16	1		

Description

This apparatus is used in laboratories for mixing chemicals and solutions.

Construction

The frame for gearing consists of two F9's and two F5's fixed to E1 by a U1 and two S25's. A U2, carrying an S55 with worm and G20, is fixed to one of these F9's, and the worm meshes with a GB20 with an S120 as its spindle. This spindle is located underneath the E1 by a GB10. An F5 at end of spindle forms the agitator. Front legs are F17's and rear leg is formed by F13's lengthened by F9's. The fixing for this leg is a U2 bolted to the motor side which in turn is fixed to the E1. This leg is braced by a spanner.



Underneath View

MECHANICAL HAMMER

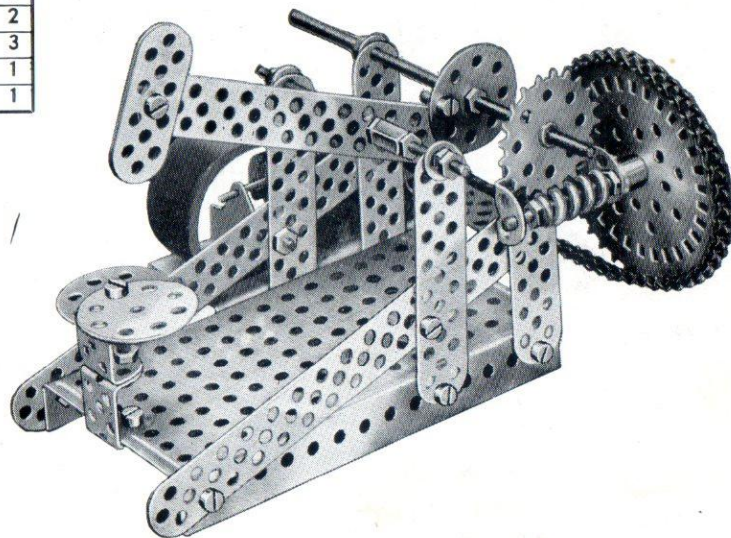
SPECIFICATION							
Part No.		Part No.		Part No.		Part No.	
B1	15	F13	1	N2	1	U1	2
B2	2	F17	2	P29	3	U2	2
E1	1	GB20	1	S25	1	W10	3
F5	2	GB40	1	S55	3	Wm.	1
F9	4	N1	33	S120	1	Ch.	1

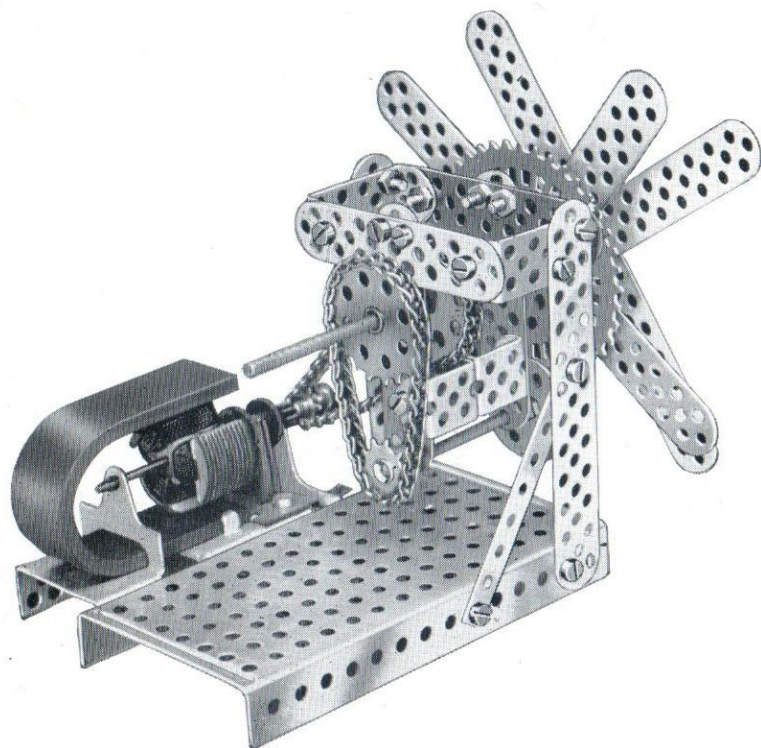
Description

This type of machine was formerly used in the metal plate making industry.

Construction

Make frame from four F9's and two F17's bolted to an E1 as shown. Spindle for hammer consists of an S55 and S25 joined by N2 and N1's, and is free to swing in the F9's. A U2 carries an S55 with worm which meshes with a GB20 on an S120. Hammer is raised by the B1/N1 in one of the outside holes of the P29, as it rotates. Motor drives by chain the GB40 on the worm shaft (S55).



POWER TRIX

CONTRA—ROTATING PROPELLERS

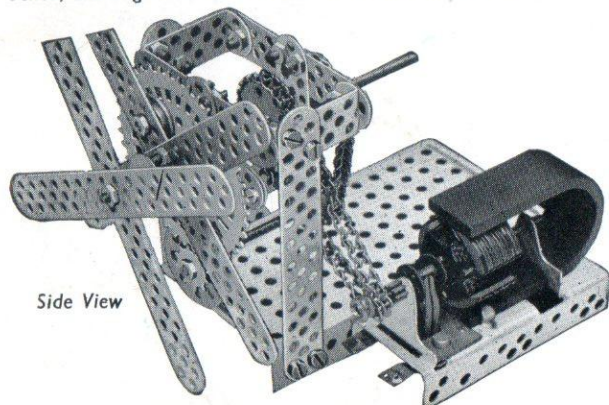
SPECIFICATION					
Part No.		Part No.		Part No.	
B1	26	GB10	1	U1	2
B2	2	GB20	1	U2	2
E1	1	GB40	1	W10	3
F9	4	N1	35	W16	2
F13	2	N2	1	Ch.	1
F17	4	P29	1	Sp.	1
G10	1	S55	1		
G20	1	S120	1		

Description

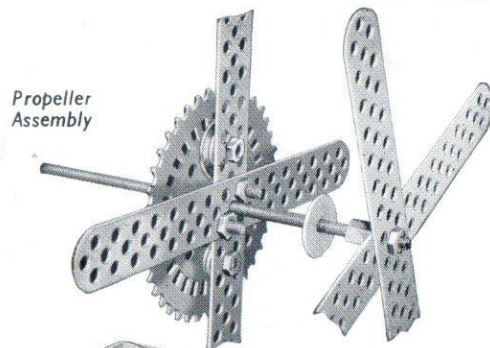
The fantastic power of modern aircraft engines calls for propellers of very large diameter, resulting in lengthy undercarriage units, and, in single engined aircraft a dangerous torque or tendency of the aeroplane to roll in the opposite direction to the propeller. To overcome this, designers have perfected the contra-rotating propeller system whereby a gearbox and shaft arrangement drives two smaller diameter propellers, one behind the other, in opposite directions. Our unit shows in simplified form how this system operates.

Construction

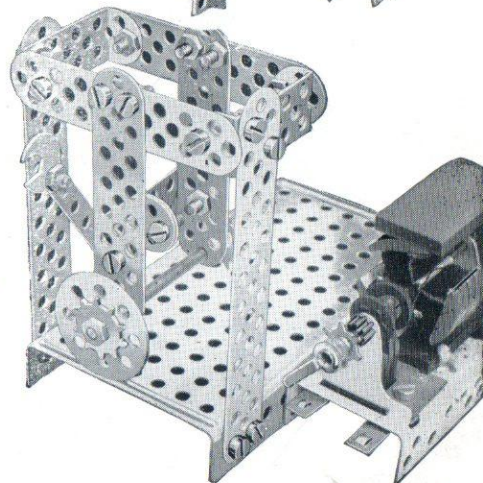
A rectangular frame made from two F9's, joined by U2's is fixed to vertical F13's attached to the E1. Two vertical F9's are attached centrally to these horizontal F9's and spaced at the lower end by two U1's. The lower gear shaft (S55) in the end holes of F9's carries at one end a GB10 and at the other locknuts to prevent lateral movement of spindle. Then add another N1, P29, G10 and N1 in that order. The upper shaft (S120) carries at one end a GB20 which drives by chain the GB10 on the lower shaft. Fixed to the S120 between the F9's, is a G20 which is driven by chain from the motor. Now make the first propeller assembly from a GB40, two F17's and washers as shown and slip it on to the S120 so that the gear is free on the shaft, and meshes with the G10 on lower shaft. Fix the second set of propeller blades (F17's) to the S120, with a W16 and N2 as spacers so that each fan rotates freely without binding and without any lateral movement. When the model is running it will be seen that one set of blades rotates in the opposite direction to the other, although both are driven from the one motor.



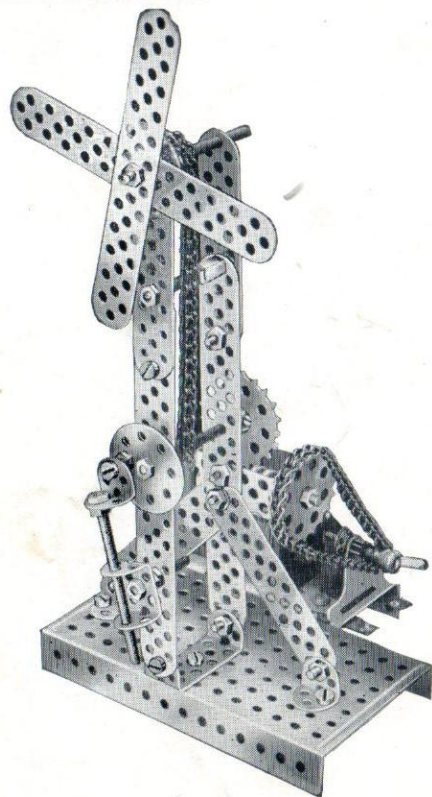
Side View



Propeller Assembly



Frame Assembly

POWER TRIX**WINDPUMP****SPECIFICATION**

Part No.		Part No.		Part No.		Part No.	
A1	3	F17	2	N2	1	W10	3
B1	15	G10	1	P29	2	W16	2
B2	2	G20	1	S25	2	Wm.	1
E1	1	GB10	1	S55	4	Ch.	1
F9	4	GB20	1	U1	1		
F13	2	N1	36	U2	2		

Description

These machines are mainly used for driving pumps, and for drainage and watering of crops, etc.

Construction

Uprights are F17's lengthened by F9's and spaced near the top by two N1's, S25, N2 and B1. Motor drives a G20 on S55 which also carries a worm and works in a U2 fixed to F17. This worm meshes with a GB20 attached to one end of an S55 ; to the other end a P29 is fixed, and drives the pump, an S55 and A1, by loose joint SCD18.* Pump body U1 oscillates in the F17 by means of an S25 held by lock nuts.

The spindle carrying the sails (F13's) is driven by chain from the lower spindle using a GB10 and G10 respectively.

*For details of SCD's (Standard Constructional Details) see pages 4 and 5 of the Abridged Engineering Manual.

DRILL

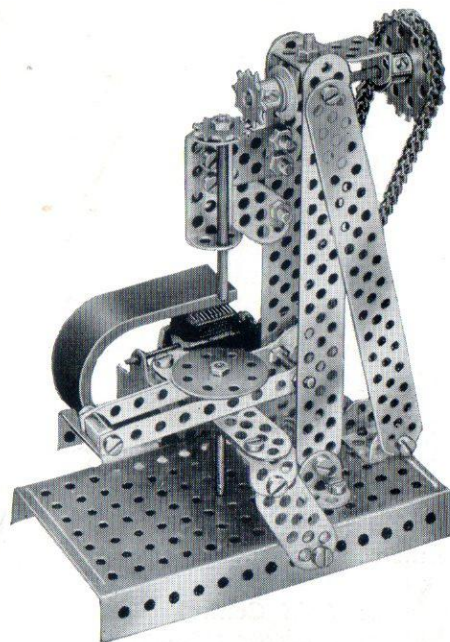
SPECIFICATION							
Part No.		Part No.		Part No.		Part No.	
A1	4	F17	3	P29	1	W16	2
B1	23	G10	1	S25	1	Ch.	1
B2	2	GB10	1	S55	3	Sp.	2
E1	1	GB20	1	U1	2		
F5	4	N1	31	U2	2		
F9	1	N2	1	W10	3		

Description

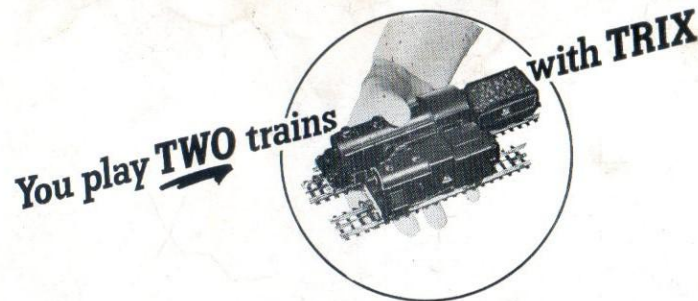
Power driven drilling machines will be found in the machine shop of almost every engineering works. Specially suitable for repetition work where great speed and accuracy is required.

Construction

Main column F17's are fixed to base E1 by A1's, and held at the top by a U1. A U2 is bolted to this U1 and carries an S55 with a GB20 and GB10. This GB10 meshes with a G10 also on an S55 which forms the drill spindle. The bearing for this spindle is a vertical U2 fixed to the main column by two F5's. Use W10's and W16's to ensure correct meshing of gears. Drilling table (P29 on S55) is raised and lowered by two spanners which pivot in the column by an S25. Motor is fixed to E1 and drives by chain the top GB20.



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