The New Meccano Ship-Coaler

An Old Favourite in a New Form

A mechanical ship-coaling apparatus forms an ideal subject for Meccano model-building. The model described below incorporates many entirely new features and constitutes a big improvement upon earlier Meccano structures of a similar nature.

FOR a long period the coaling of steamships was carried out entirely by hand labour, and even to-day this is the case in many eastern ports. Coaling by hand cannot be otherwise than a dirty operation, causing intense discomfort to all on board. The late Sir Frederick Treves, in his interesting book "*The Other Side of the Lantern*," gives a graphic description of the miseries of coaling at Port Said. "Clouds of coal-dust envelop the poor vessel," he says, "and penetrate into every part of it. The deck becomes an ash drift. Whatever the hand finds to touch, it finds to be black. Coal-dust becomes the breath of the nostrils, coal-dust settles upon the face, powders the neck, and creeps among the hair. Moreover, in no part of the ship is there any escape from the husky din which accompanies the ritual of coaling."

On this particular occasion the coaling took place at night from great coal-carrying rafts containing gangs of hundreds of coolies. Each raft carries high aloft cressets or iron baskets blazing with fire. "The rafts are made fast to the great vessel, planks are run up to the coal bunkers, and then there begins an unceasing procession of gaunt folk carrying yellow baskets full of coal up one plank and returning with them empty along another. As they pass up and down, their rags dance in the wind, clouds of coal-dust and smoke circle round them, while the light from the cressets flashes fitfully upon the file, making their sweating limbs glow as with a fervent heat. The stream of basket carriers might be coming out from the crater of a volcano, and it is a matter of wonder that they are neither charred nor smothered . . .

"Hour after hour the dry tramp of feet along the plank continues, hour after hour the same hoarse dirge is screamed forth from a hundred creaking throats, hour after hour the spades are at work and the baskets come and go. Then the scuffle of feet ceases, the scrape of the shovels dies away, the fire in the cressets flutters out, the barges are empty, and to the same weird chant they glide away and are lost in the gloom." Such methods are picturesque but unscientific.

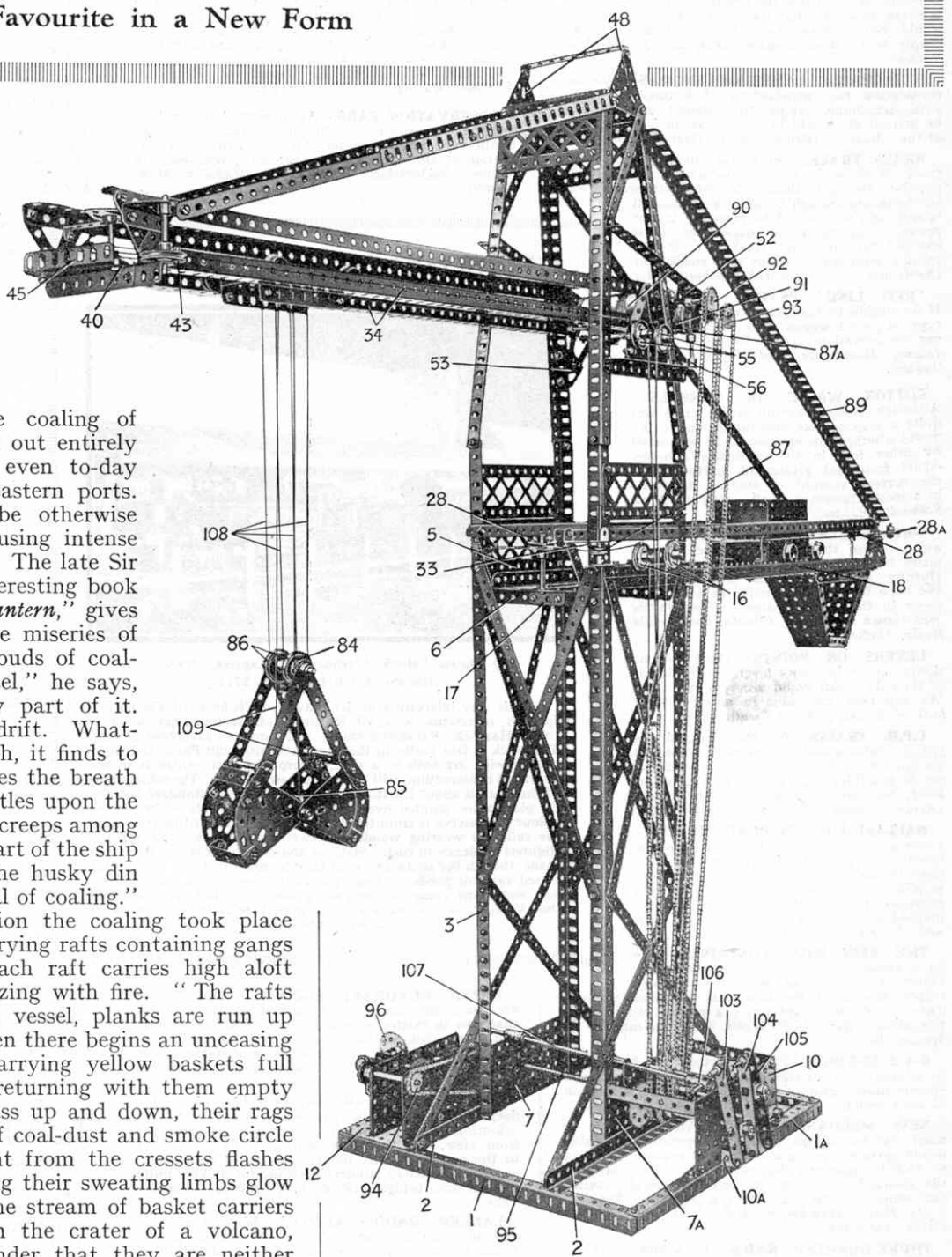

Fig. 1. General view of the Model

Coaling by Machinery

Coaling by hand on these lines is only possible in parts of the world where ample and cheap native labour is available. Elsewhere machinery must be called into play to carry out operations at a sufficient speed, and yet economically. The method employed for transferring the coal from the quayside to the ship's bunkers varies considerably in different ports, according to local

conditions and circumstances. The coaling facilities of the larger ports are naturally on a more elaborate and more interesting scale than those at the smaller ports. At Liverpool, for instance, one well-known firm has a whole fleet of floating coaling machines operated by grab in conjunction with belt conveyor, and also by bucket elevator and chutes. These machines correspond very closely in their working principles to the Meccano model about to be described.

The grab machines do not themselves carry any coal, but are moored alongside the vessel to be coaled, and barges containing the coal are brought alongside the grab machines. The grab is lowered into the barge, from which it takes up in its great steel jaws a mouthful of coal weighing something over a ton. This coal is raised to whatever height may be required and is then released on to a travelling belt conveyor, by which it is carried across the deck of the vessel to the hatchways. In the Meccano model, the automatic discharging truck corresponds to the belt conveyor.

While the coal is on its journey along the conveyor the grab descends again and takes up another load, and so the process goes on, the loading proceeding at the rate of over 100 tons per hour. As soon as one barge is emptied, another one takes its place, so that the loading continues without interruption until the necessary amount of coal has been taken on board.

The machines operated by bucket elevator and chutes differ from the grab machines in that they themselves carry the coal. They are capable of holding from 1,000 to 1,100 tons. The coal is made to fall in regulated quantities through a false bottom on to a travelling chain of buckets, which lift it to the top of the machine and discharge it down chutes directed either over the decks into hatchways, or into side ports. By means of elevator machines coaling can be carried out at the rate of some 300 tons per hour. In addition, the coal can be delivered overall to a height of more than 50 ft., thus ensuring the speedy coaling of a large liner without any necessity for the vessel to move from her loading or discharging berth.

The Meccano High-speed Ship-coaler has been designed specially to illustrate the possibilities of mechanical coaling. It is one of the most interesting of all Meccano models, and if carefully constructed it operates with wonderful precision and in a most realistic manner. The whole of the movements necessary for coaling a miniature ship are controlled from a central gear box situated in the base of the model, and are carried out with perfect accuracy. The model is one that makes a particular appeal to Meccano enthusiasts because, in addition to the enjoyment of building it, it affords endless fun when completed. Moreover, a considerable amount of dexterity is required for its successful manipulation. There are so many movements that the operator has to use his intelligence all the time, and must be quick with his fingers in order to carry out the various stages without a hitch. In other words, it is just as exciting to operate as it is to build—an ideal model for all really enthusiastic Meccano Boys. It is particularly suited for use in loading Hornby Wagons from a miniature coal-dump.

The Main Tower

The construction of the model should be commenced by building the main tower. Fig. 2 shows the tower in detail, with superstructure, gearing, etc., removed. The base of the tower consists of four $12\frac{1}{2}$" Angle Girders 1 bolted in the form of a square and spanned by two similar Girders 2. Four $24\frac{1}{2}$" Angle Girders 3, forming the chief supports of the tower, are braced at the top by the $5\frac{1}{2}$" Angle Girders 6, 6a and the $5\frac{1}{2}$" Braced Girders 4, 5, whilst their lower ends are joined by two $5\frac{1}{2}" \times 2\frac{1}{2}$" Flat Plates 7, 7a. The rigidity of the structure is increased by crossed $12\frac{1}{2}$" Strips 8, 9.

The framework of the gear box is formed by erecting a $5\frac{1}{2}" \times 2\frac{1}{2}$" Flat Plate 10 edgewise on one of the base Girders

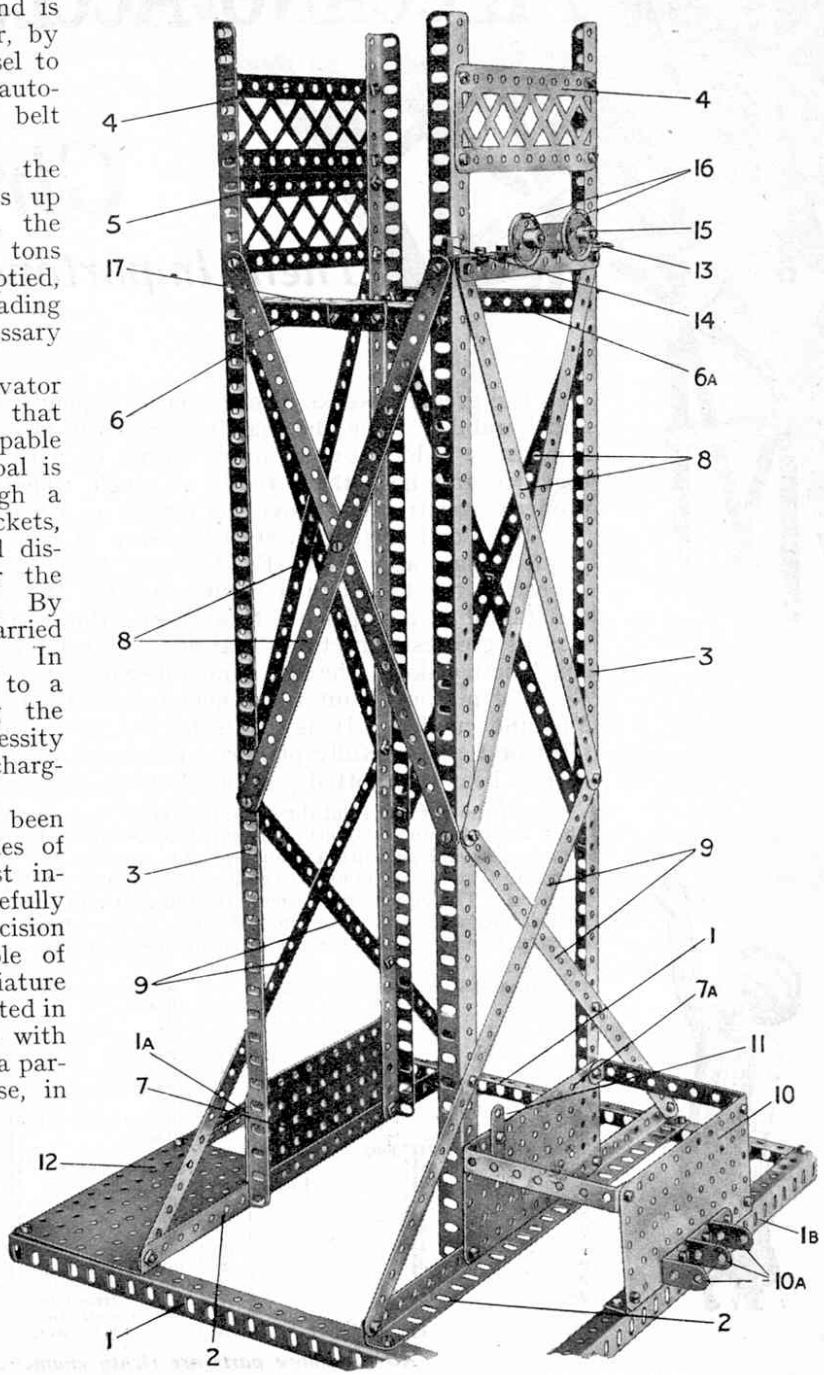

Fig. 2. Detail view of Main Tower

1 and joining it to the Plate 7a by means of two $3\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips. Three $1'' \times 1''$ Angle Brackets 10a are secured to the outer side of the Plate 10, and a $1\frac{1}{2}''$ Strip 11 is attached in a vertical position to the Plate 7a. A $5\frac{1}{2}'' \times 3\frac{1}{2}''$ Flat Plate 12, bolted to the base in the position shown, forms the bed to which an Electric Motor will later be attached.

A $5\frac{1}{2}''$ Angle Girder 13 bolted near the upper ends of two of the Girders 3, above the gear box, carries a Crank 14, and a 2" Angle Girder 15 secured to the Girder 13 carries two 1" loose Pulley Wheels 16, which are mounted on Threaded Pins and kept in position by Collars and set-screws. The addition of a Trunnion 17 to the Girder 6 completes the construction of the main tower unit. Care should be taken that all parts are situated correctly, as each will have a definite use in the completed model.

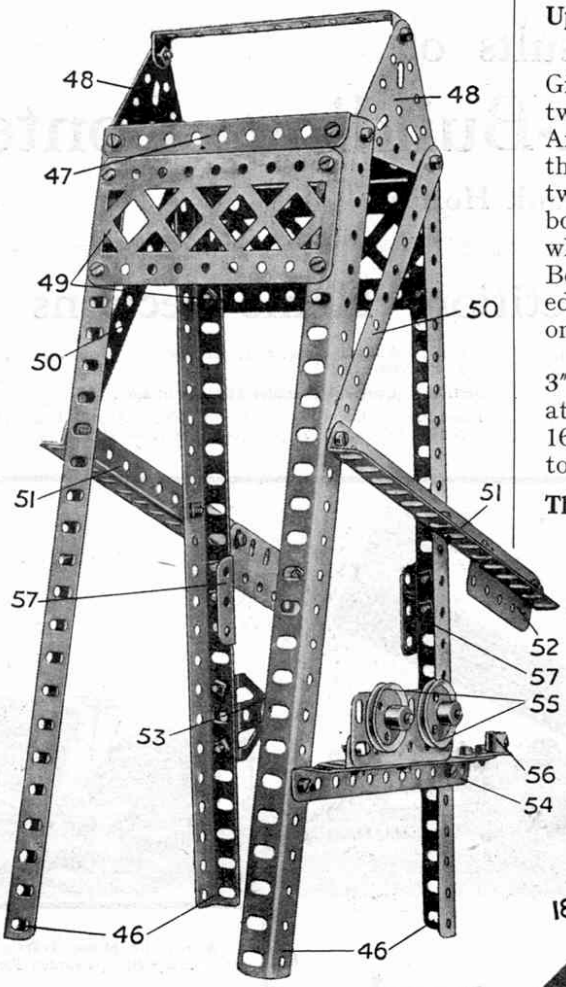

Fig. 3. Upper Portion of Tower, with Gearing and Mechanical Details, etc., removed

Upper Portion of Tower

The upper tower (Fig. 3) is built of four $12\frac{1}{2}''$ Angle Girders 46 surmounted by two $4\frac{1}{2}''$ Angle Girders 47 and two $2\frac{1}{2}''$ Triangular Plates 48 joined by a $4\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip. The wider sides of the tower are strengthened by $4\frac{1}{2}''$ Braced Girders 49, and the narrow sides by two $5\frac{1}{2}''$ Strips 50. To the ends of these Strips 50 are bolted the $7\frac{1}{2}''$ Angle Girders 51, the projecting ends of which slope downward and carry $2\frac{1}{2}''$ Flat Girders 52. Below the Girders 51, two $1\frac{1}{2}''$ Angle Girders 57 are attached to the upright 46 as shown, and further down, on one side only, is a Trunnion 53.

The $5\frac{1}{2}''$ Angle Girder 54 carries a 3" Angle Girder and a 3" Flat Girder, to which the 1" loose Pulleys 55 are attached by Threaded Pins in the same way as the Pulleys 16 (Fig. 2). A Crank 56 is bolted as shown (Fig. 3) to the short projecting end of the Girder 54.

The Truck Runway

The construction of the truck runway, together with the chute from which the coal is finally discharged into the hold of the ship, will be followed from Fig. 4. Two $24\frac{1}{2}''$ Angle Girders 18 separated by $3\frac{1}{2}''$ Strips 19, 20 and a pair of $3\frac{1}{2}''$ Flat Girders 21, are the rails on which the truck (Fig. 6) runs. At the outer ends of the rails are the $2\frac{1}{2}''$ Triangular Plates 22, and at the inner ends are the $2\frac{1}{2}''$ Strips 23. The latter are joined to the Plates 22 by the Strips 24, which consists of $12\frac{1}{2}''$ Strips connected end to end by overlapping 3" Strips 25.

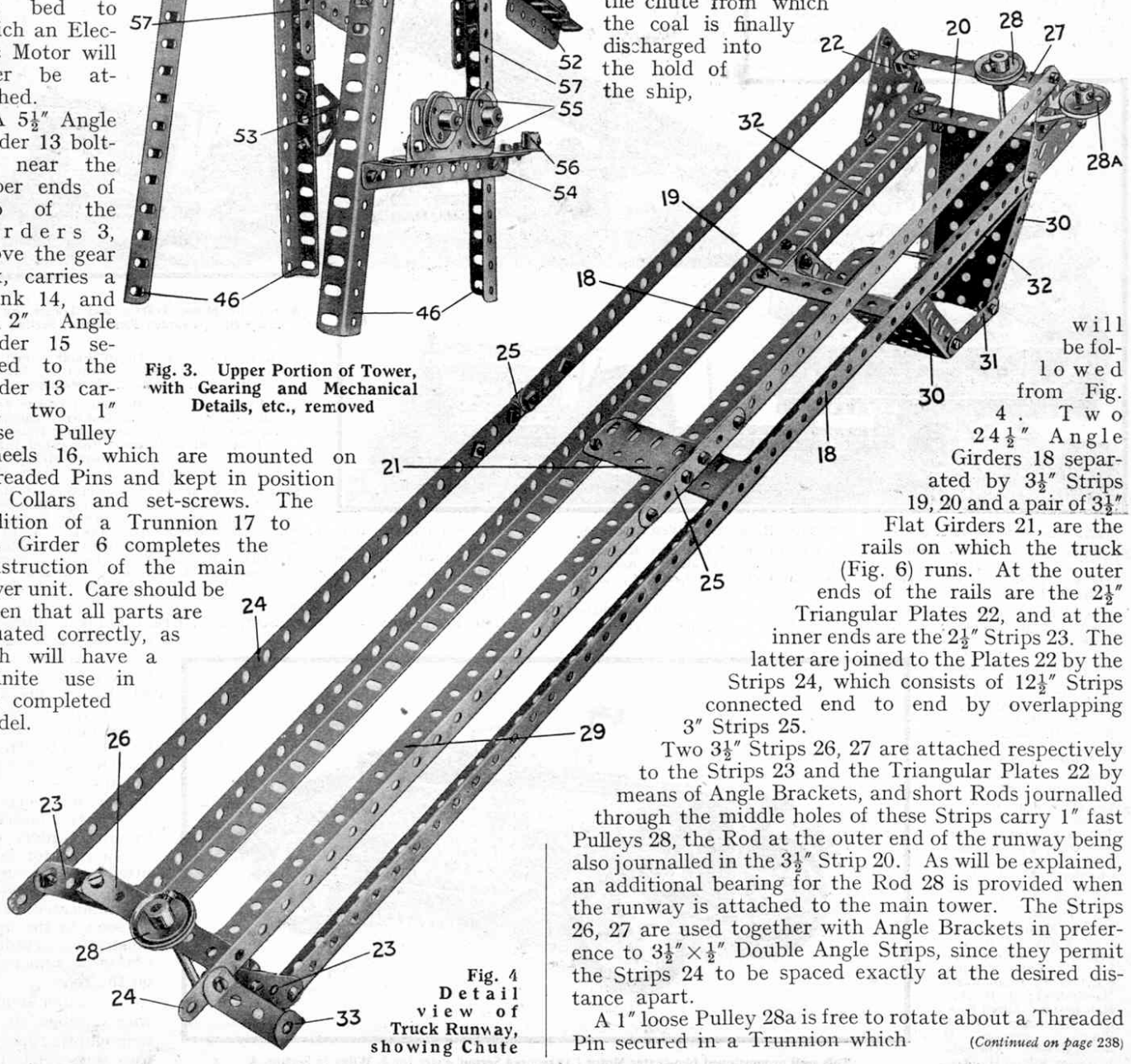

Fig. 4 Detail view of Truck Runway, showing Chute

Two $3\frac{1}{2}''$ Strips 26, 27 are attached respectively to the Strips 23 and the Triangular Plates 22 by means of Angle Brackets, and short Rods journalled through the middle holes of these Strips carry 1" fast Pulleys 28, the Rod at the outer end of the runway being also journalled in the $3\frac{1}{2}''$ Strip 20. As will be explained, an additional bearing for the Rod 28 is provided when the runway is attached to the main tower. The Strips 26, 27 are used together with Angle Brackets in preference to $3\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips, since they permit the Strips 24 to be spaced exactly at the desired distance apart.

A 1" loose Pulley 28a is free to rotate about a Threaded Pin secured in a Trunnion which

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