C. L. HUSTON.

TRANSFER TABLE FOR ROLLING MILLS.

APPLICATION FILED APR. 29, 1905.

942,644. Patented Dec. 7, 1909.

8 SHEETS—SHEET 1.

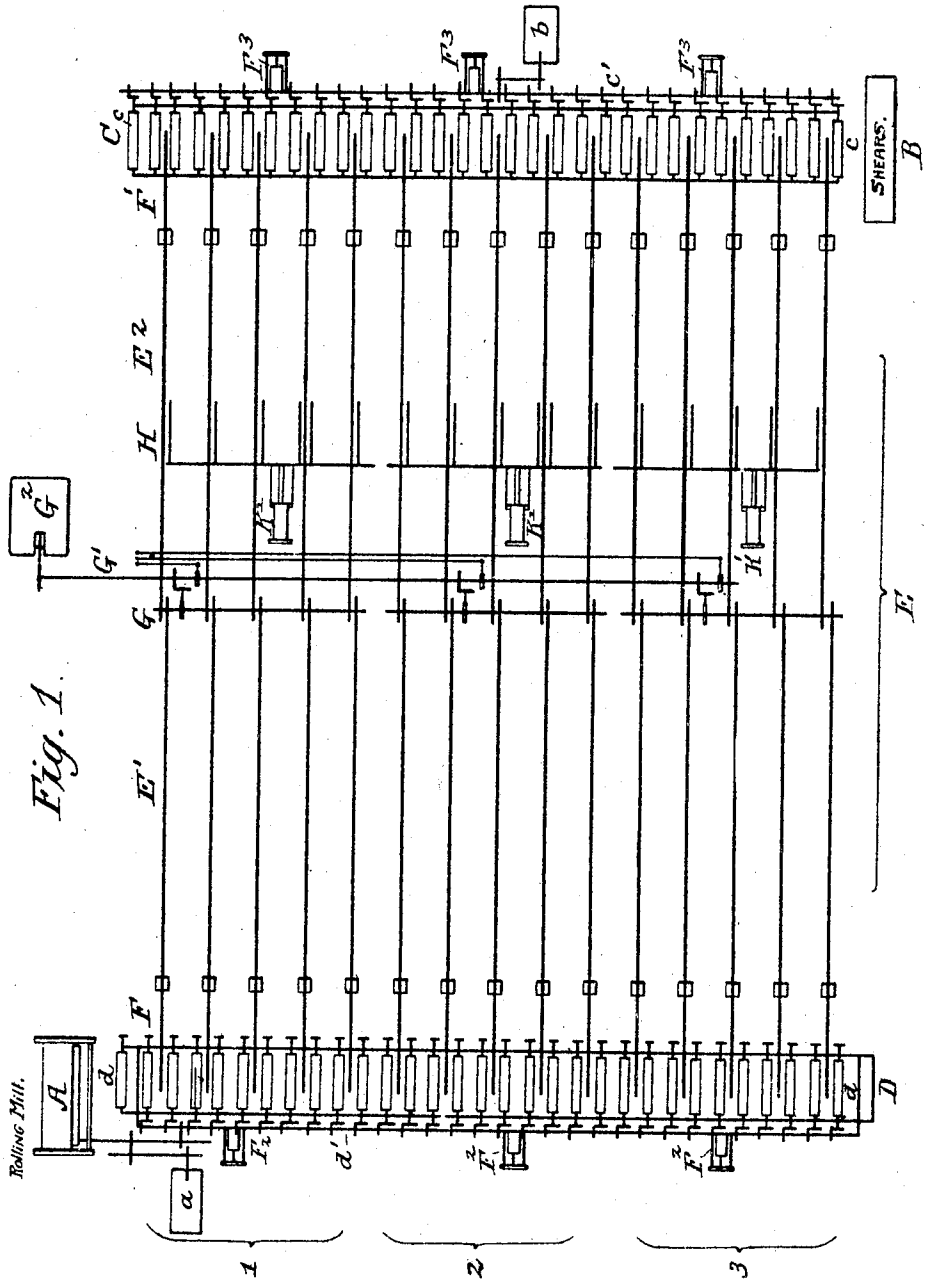

Fig. 1.

Witnesses:
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Augustus B. Coppes

Inventor:
Charles L. Huston.
by his Attorneys:
Howson & Howson

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8 SHEETS—SHEET 2.

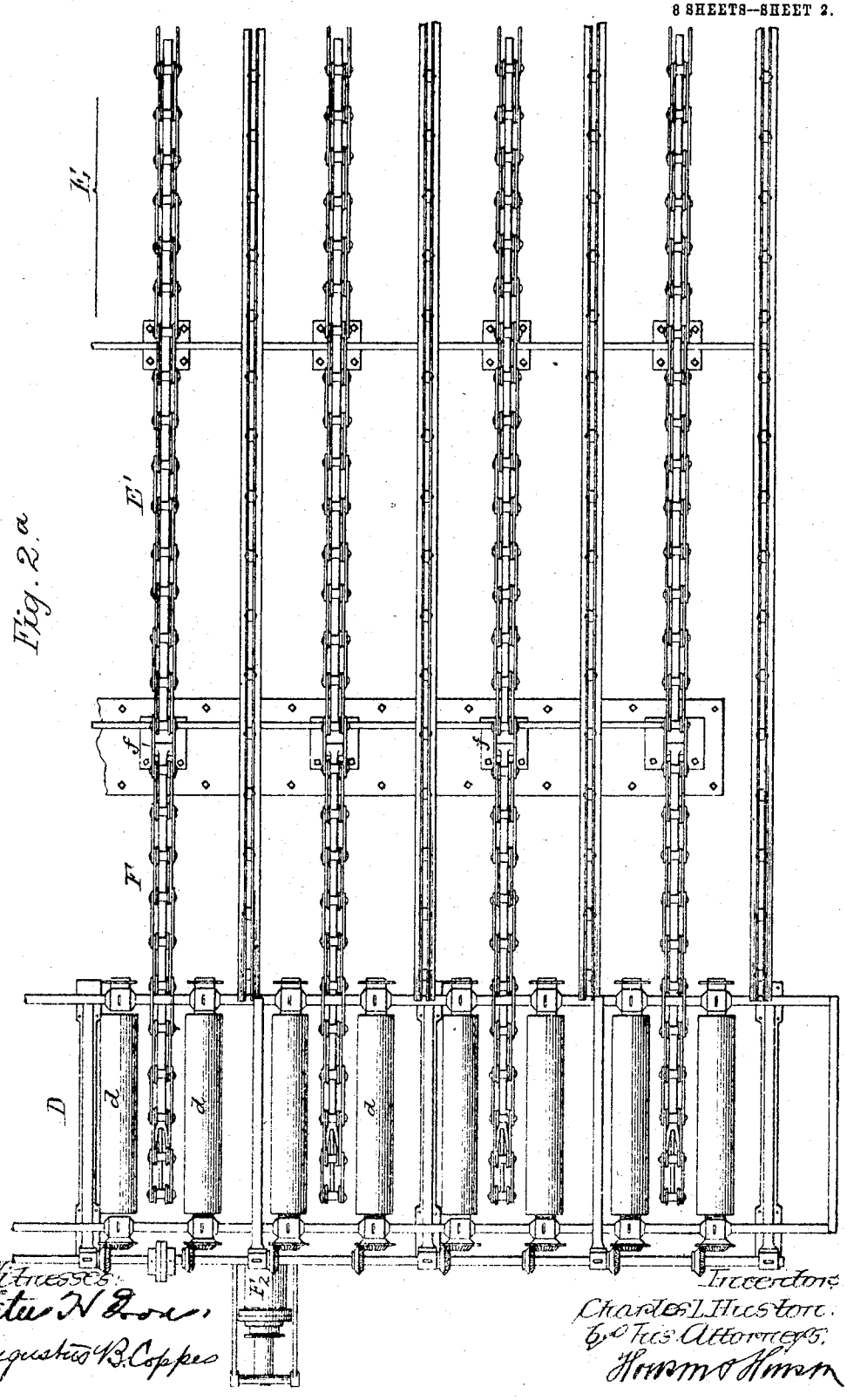

Fig. 2.a

Witnesses:
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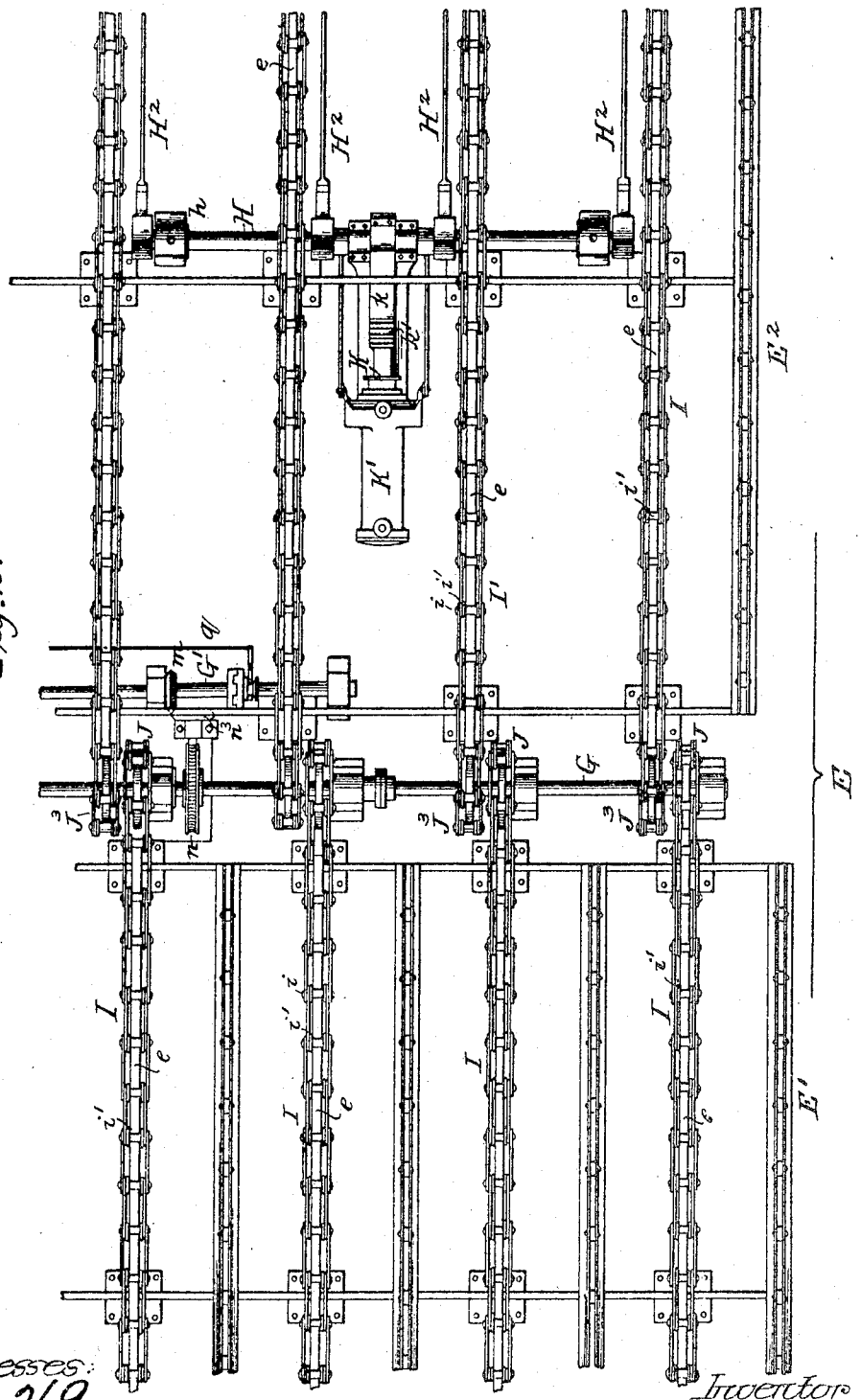
8 SHEETS—SHEET 3.

Fig. 2.



Witnesses:
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8 SHEETS—SHEET 4.

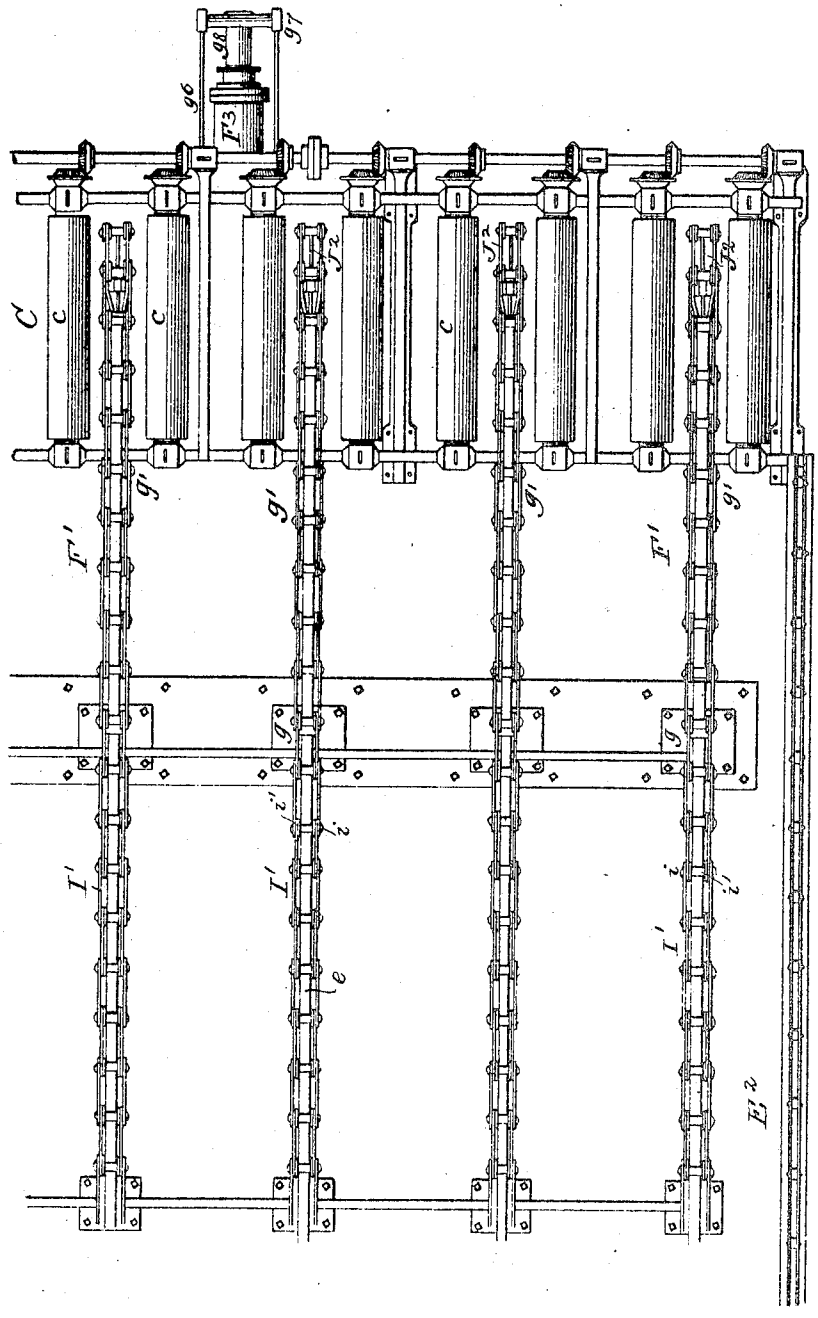

Fig. 2c

Witnesses:
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8 SHEETS—SHEET 5.

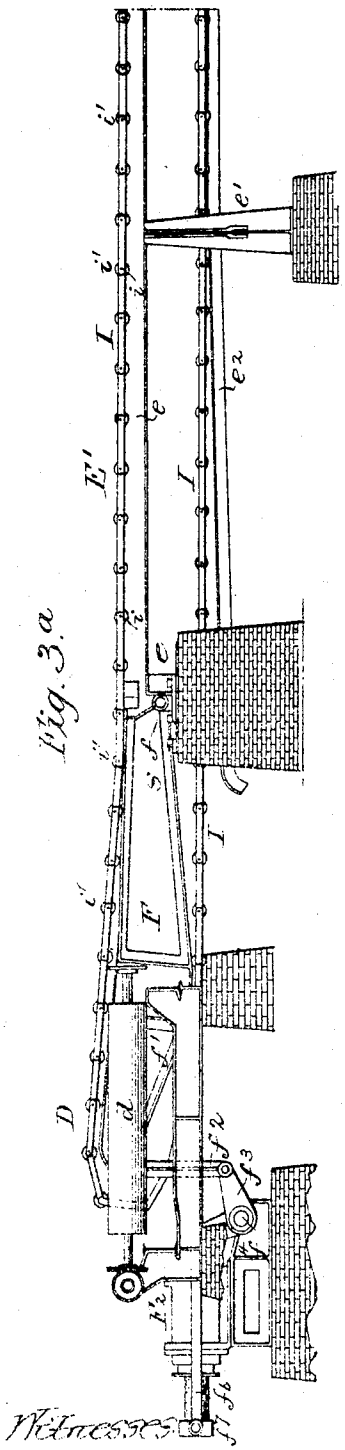

Fig. 3.a

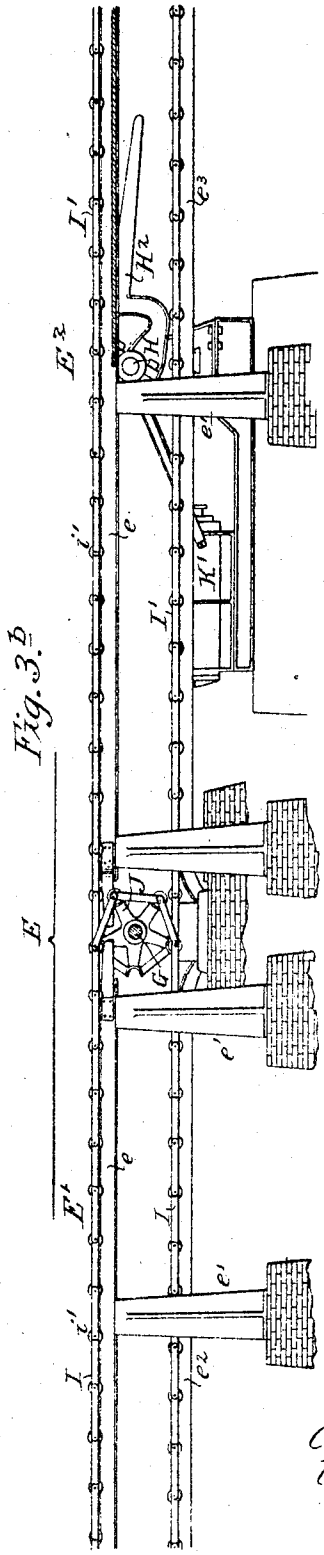

Fig. 3.b

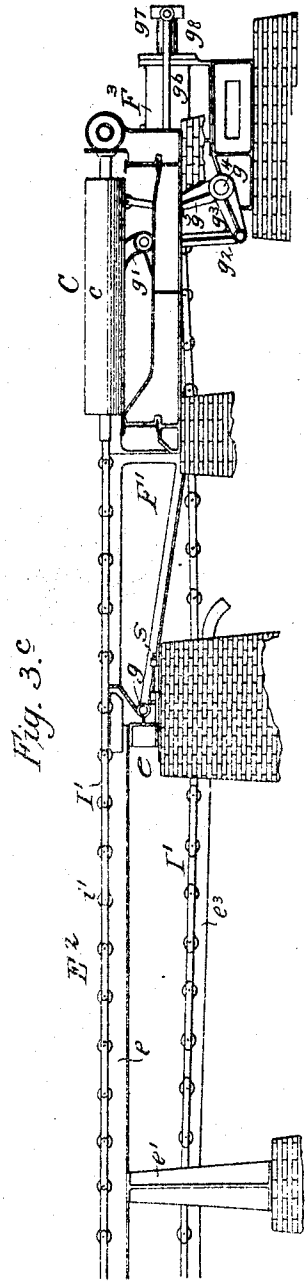

Fig. 3.c

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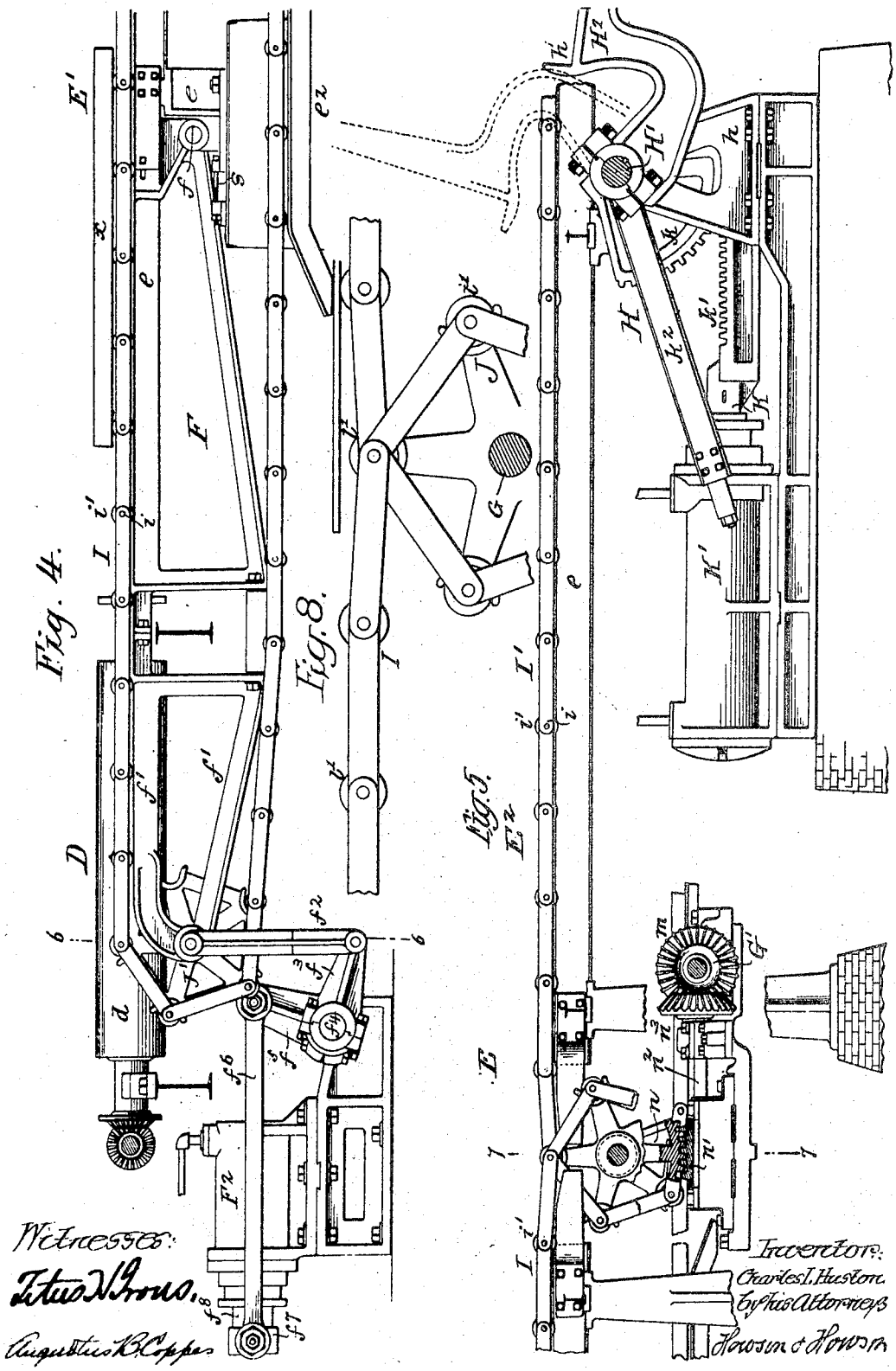
8 SHEETS—SHEET 6.



C. L. HUSTON.

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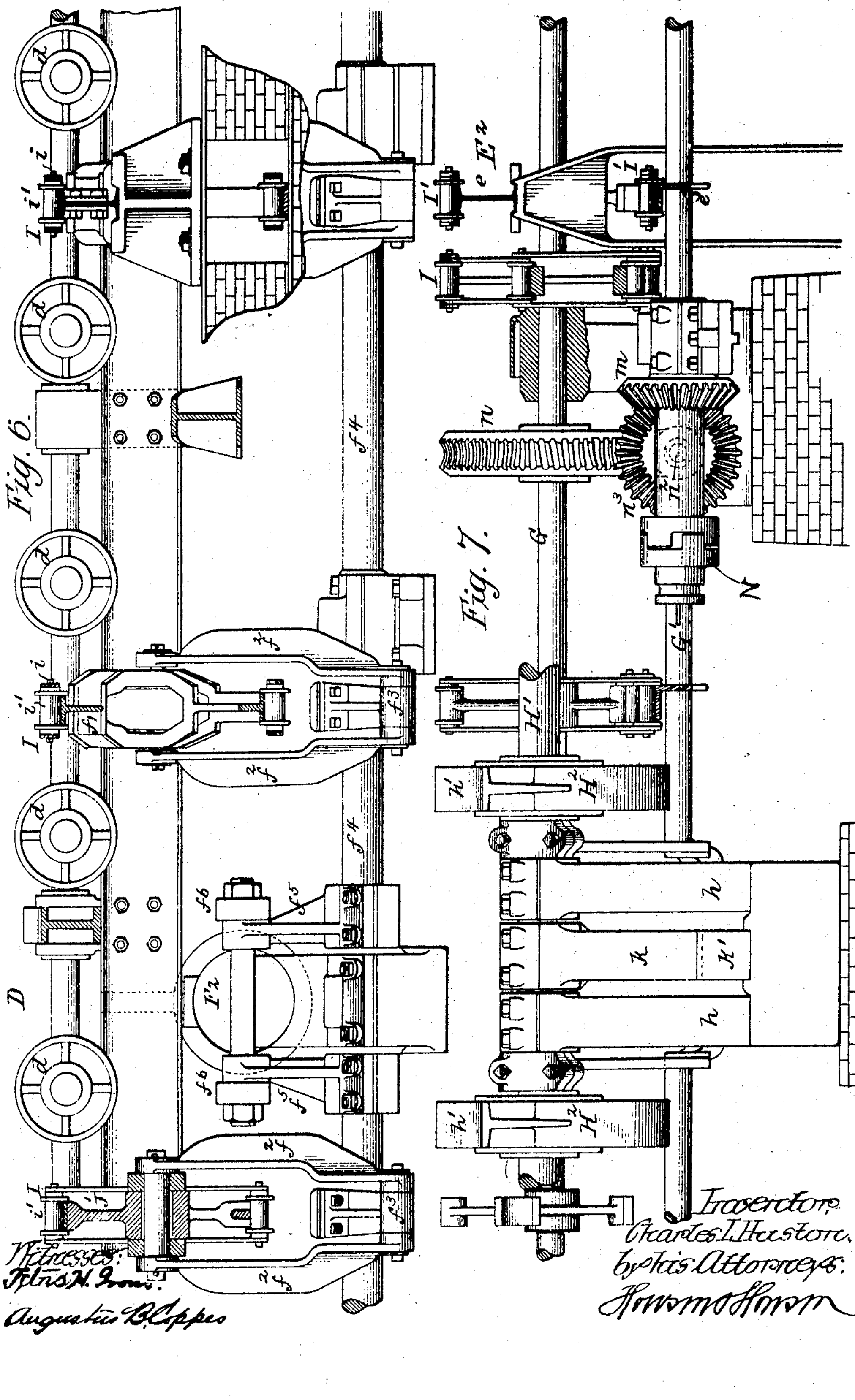
8 SHEETS—SHEET 7.



Witnesses:

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Augustus B. Coppes

Inventor:

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by his Attorneys:

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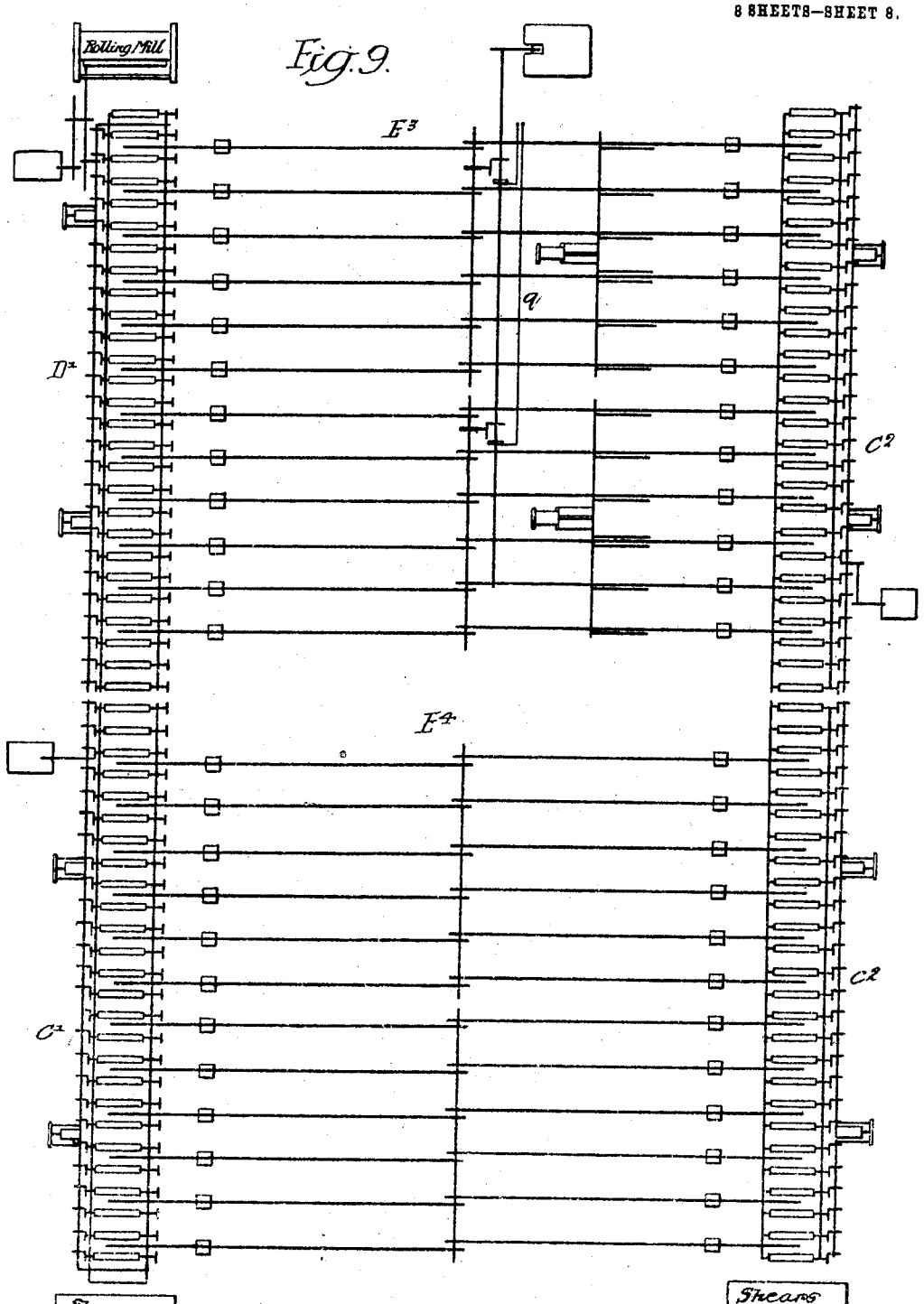
Patented Dec. 7, 1909.

8 SHEETS—SHEET 8.

Fig. 9.



Witnesses:
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Augustus B. Coppes.

Inventor
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by his Attorneys,
Bowson & Howson

UNITED STATES PATENT OFFICE.

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TRANSFER-TABLE FOR ROLLING-MILLS.

942,644. Specification of Letters Patent. Patented Dec. 7, 1909.

Application filed April 29, 1905. Serial No. 258,073.

To all whom it may concern:

Be it known that I, CHARLES L. HUSTON, a citizen of the United States, residing at Coatesville, Pennsylvania, have invented certain Improvements in Transfer-Tables for Rolling-Mills, of which the following is a specification.

My invention relates to certain improvements in transfer tables for rolling mills by which a plate, after it has been rolled, can be transferred to the shears and given sufficient time in its transfer to properly cool before being cut.

The object of my invention is to provide a table which can be readily manipulated so as to transfer a plate from the rolling table of the mill to the roller table of the shears, and to provide means for examining the underside of the plate while on the table. This object I attain in the following manner, reference being had to the accompanying drawings, in which:—

Figure 1, is a diagram plan view of my improved transfer table for rolling mills; Fig. 2^a, is a plan view of a portion of the rolling mill end of the table; Fig. 2^b, is a plan view of the middle section of the table; Fig. 2^c, is a plan view of a portion of the shears end of the table; Fig. 3^a, is a longitudinal sectional view of the table shown in Fig. 2^a; Fig. 3^b, is a longitudinal section view of the table shown in Fig. 2^b; Fig. 3^c, is a longitudinal sectional view of the table shown in Fig. 2^c; Fig. 4, is a longitudinal sectional view showing the means for raising and lowering the rolling mill end of the transfer table; Fig. 5, is a longitudinal sectional view showing the gearing for operating the enchained rollers and the means for operating the lifting arms for raising the plate when it is to be examined; Fig. 6, is an enlarged sectional view on the line 6—6, Fig. 4; Fig. 7, is an enlarged sectional view on the line 7—7, Fig. 5; Fig. 8, is a detailed view of Fig. 5; and Fig. 9, is a diagram plan view illustrating a modification of the lay out of the table.

Referring in the first instance to the diagram, Fig. 1, A indicates a rolling mill of any suitable type, D is a roller table at the rear of the mill, B indicates the shears which may be located in any position in front of a roller table C. The tables C and D are of the ordinary construction. The rolls *d* of the table D are driven by a longitudinal shaft *d'* from an engine *a* under the control of the operator at a suitable point, while the rolls *c* of the table C are geared to a longitudinal shaft *c'* and are driven by an engine *b*. The tables C and D are spaced a sufficient distance apart so as to allow for the insertion of a transfer table E which extends from one roller table to the other. The transfer table is of sufficient size to allow the plates to cool while being transferred from the rolling mill to the shears. This transfer table is made up of two sections E' and E^2 and the rolling mill end F of the section E' extends between the rolls of the table D and can be raised and lowered so that it can lift a plate off of the rolls in order that it can be moved onto the body of the transfer table, while the shear end F' of the section E^2 extends between the rolls of the table C so that a plate can be moved from the transfer table onto the shears table. The sections of the transfer or cooling table are made up of a series of frames spaced a given distance apart, upon which travel enchained rollers. The individual chains do not extend from one end of the table to the other but extend from one end to the center, each section E' carrying a series of endless chains, the chains being driven from a central shaft G which in turn is driven from a power shaft G' geared to an engine G^2 under the control of the operator.

H is the lifting mechanism consisting of a shaft and a series of arms with mechanism for turning the shaft so that the arms can be raised. By this construction the plates can be raised off of the rollers of the table and the underside of the plate inspected before it is sheared and while still undergoing the cooling process. I preferably provide a platform P on one half of the transfer table for the men to walk upon when marking off the plates for shearing and while examining the plates.

It will be noticed in the diagram that the table is divided into three longitudinal parts, in the present instance, 1, 2 and 3, so that in fact there are several independent cooling tables arranged side by side and the mechanism is so constructed that the mechanism of any one of the tables can be operated without operating the others, or the mechanism of the several tables can be driven in unison. By this construction it will be seen that if short plates are being rolled only one section at a time may receive the plates, the roller table D of the mill being driven for-

ward or reversed so that the plate can be moved in line with any of the several sections of the cooling table, and then by lifting the end of the cooling table the plate can be transferred to any part desired. Where the plate is long then two of the parts may be manipulated simultaneously, or three parts if desired.

It will be understood that the table may be divided into any number of parts without departing from my invention.

I will give a brief outline of the operation of the table. The finished plate passes from the mill A onto the roller table D, then when it is wished to transfer it onto the cooling or transfer table the end portion F of one of the parts is raised at the same time the enchained rollers are set in motion so that the plate is lifted off the rolls d and the chains being driven will carry the plate transversely from the roller table and the plate will rest upon the rollers of the transfer table E. The mechanism for operating the enchained rollers can then be stopped at any point desired until another plate is ready to be transferred. When the plates pass the center of the cooling table they can be examined. The plates are carried over the arms of the lifting mechanism, which lifts a plate and turns it to such an angle that the inspector can readily examine the underside of the plate. After the examination is made the plate is lowered and allowed to again travel over the transfer table. When the plate reaches the end portion F′ of the table this portion is raised so that the plate will be transferred to a position directly above the rolls c of the roller table C, then the end portion is depressed so that the plate will rest directly upon the rolls c, and can be moved forward toward the shears by throwing in the driving mechanism of the said rolls.

The above will give a general idea of the operation of the mechanism.

Referring now to the detail views of the drawings, I will describe the construction of the apparatus. The transfer table E consists of a series of longitudinal beams e mounted on standards e' carried by suitable foundations, as illustrated in Figs. 3^a, 3^b and 3^c. These longitudinal beams are discontinued at the center, as shown in Fig. 3^b, as the table is divided into two parts E′, E^2, as illustrated in the diagram, Fig. 1. The portion F is pivoted at f to the end standards e of the section E′, a suitable foundation being built to carry this part of the structure. The portion F consists of a series of arms f' which extend between the rolls d of the roller table D, as clearly illustrated in Fig. 2^a. Each of these arms is connected by a rod f^2 to an arm f^3 on a rock shaft f^4 and on this rock shaft is an arm f^5 attached to a connecting rod f^6, which in turn it attached to a cross head f^7 of a plunger f^8 mounted in the hydraulic cylinder F^2 which can be manipulated from the operator's platform so that when the plunger is forced out the rock shaft f^4 will be turned and the end portion F′ of the table will be raised. By reversing the mechanism the arms will be depressed so that the end portion F will be below the upper surface of the rolls d.

I is an endless chain consisting of a series of links pivoted together at i, and mounted on these pivots are the rollers i' flanged in the present instance, the rollers being of such a width that the flanges will extend on each side of the beams e and arms f', retaining the chain in proper position upon the table. The chain passes around a driving sprocket wheel J on the central shaft G and around sprocket wheels J′ carried by the arms f' of the end portion F of the table. It will be noticed that the rollers i' extend above the links of the chain so that the plate is not supported by the chain but by the rollers as indicated in Fig. 4, in which x represents a rolled plate mounted on the transfer table. By this means I am enabled to reduce the speed of travel of the chain as the rollers i' rest upon the beams and the plate rests upon the flanges of the rollers, so that owing to this construction the plate will travel at a speed considerably faster than the chain. Furthermore, I considerably reduce the friction by the use of the rollers, as where a chain slides upon the beam and carries the dead weight of a plate the beams have to be kept constantly lubricated which is a difficult matter owing to the fact that the plates are very hot while still on the transfer table and it is impossible to keep the beams properly lubricated.

In order to allow the plates to freely pass from one section of the transfer table to the other without interfering with the rate of travel, I preferably depress the shaft upon which the sprocket wheels are mounted, so that the rollers which are prevented from turning by engagement with the sprocket wheel, will not come in contact with the plate.

The end portion F′ which transfers the plate from the table E onto the shear roller table C is constructed in a manner similar to the end portion F, being pivoted at g and having arms g' which extend between the rolls c and carry sprocket wheels J^2 at their ends around which pass the chains I′ which are provided with rollers similar to the chains I. The chains I travel on the beams of the section E^2 of the table and pass around driving sprocket wheels J^3 on the shaft G, as clearly illustrated in Fig. 2^b. The arms of the end portion F′ are connected by rods g^2 to arms g^3 on a rock shaft g^4 on which is an arm g^5 to which is attached a connecting rod g^6 coupled to a cross

head g^7 of a plunger g^8 mounted in the hydraulic cylinder F^3, so that on operating the mechanism the plunger is forced out and the table can be raised so that the rollers of the chain will extend above the upper surface of the rolls c of the roller table C. The plate can be moved directly over said rolls c and when the end portion F′ is lowered the plate will rest directly upon the rolls c and be in position to be transferred to the shears.

In order to compensate for any wear of the chains I provide means for adjusting the sections F and F′ toward and from the central fixed section of the table. In the present instance the block carrying the pivot is arranged to slide in suitable bearings in the end standard e of the frame E and set screws s are provided for adjusting the block, similar set screws are provided at the opposite end of the table. By this means all the necessary adjustment is provided for.

There is a shaft G, for each part of the transfer table. As shown on each shaft G in a worm wheel n which meshes with the worm n' on the shaft n^2 having at its opposite end a bevel wheel n^3 which meshes with the bevel wheel m loose on the power shaft G′, on the hub of the wheel m is a clutch face with which can engage the face of a clutch N splined to the shaft. The shaft G′ is driven by a motor G^2 indicated in the diagram Fig. 1.

There is a clutch for each division of the table, and the clutch lever q for throwing the clutch into and out of action is connected to an operating arm at a point within easy access of the operator, so that he can throw any one of the sections into gear with the driving shaft. When it is desired to reverse the direction of movement of the chains, all that is necessary is to reverse the engine when all the chains will travel in the reverse direction. The return run of each chain I is carried by a rail e^2 and the return run of each chain I′ is carried by a rail e^3.

The lifting mechanism is constructed as follows:—Referring to Figs. 2^b, 3^b and 5, H is the lifting mechanism. H′ is a shaft mounted in bearings h, carried by a suitable foundation and secured to the shaft is a series of arms H^2 spaced a sufficient distance apart so that two or more of the arms will engage the plate, arranged preferably in close proximity to the beams e of the table. Each arm H^2 is shaped to form an undercut throat h^2 so that when the arm is turned as shown by dotted lines in Fig. 5, the arms will not interfere with the position of a plate following the one to be examined as the arm when raised can extend over the succeeding plate. On the shaft is a toothed segment k with which engages a rack k' carried by a plunger K arranged to travel in the hydraulic cylinder K′. A brace k^2 extends from the cylinder to the bearings of the shaft.

On operating the mechanism the plunger K is forced out, causing the shafts H′ to rock and the arms which are normally below the upper surface of the rollers of the chain are turned up into a position at an angle in respect to the face of the table, as indicated by dotted lines in Fig. 5. If a plate is on the table directly above the arms when they are operated they will carry the plate up with them to such an angle that the underside of the plate can be examined by the operator. A heel h' is formed on each arm, which acts as a stop for the plate when it is elevated, so that the plate will be clear of the rollers of the chain when elevated and the chain can be operated while the plate is elevated. The stop does not interfere with the movement of the plate or chain in any sense as the arms are on the shear side of the shaft H′.

The machine is arranged so that the direction of movement of the chains can be reversed and when the arms H^2 are to be raised the arms are raised first a sufficient distance so as to allow the heel h' to extend between two plates and then the mechanism is preferably reversed so as to move the plate which is directly above the arm against the heel, thus when the arm is raised the plate will not slide on the arm and strike the heel.

The shaft G carrying the sprocket wheel need not be absolutely at the center of the table E as it may be shifted to a point on either side of the center depending upon the lay out and size of the table.

It will be seen by the above mechanism that I can transfer a plate as it comes from the rolling mill directly onto the rolling mill table and then shift it onto the transfer or cooling table, allowing the plate to remain on this table for any length of time desired, examine the plate while on the transfer table and then move it onto the roller table in line with the shears so that it can be directed to the shears and cut to the proper size.

In Fig. 9, I have shown a modification of the lay-out of the table in which a re-transfer section is shown. In this instance there is a shear table in direct line with the rolling mill table, but driven independently thereof. There is a shear table at one side as in Fig. 1, and there are two separate transfer tables one entirely independent of the other. The shear table at one side may be simply a longitudinal transfer table, in some instances, and when this lay-out is used I preferably use two shears, so that if necessity requires both shears can be operated to cut plates from one rolling mill. In this instance the plates are moved from the mill to its roller table D′ and then

moved laterally on to the first transfer table E^3 then on to the longitudinal shear table C^2, then back over the second transfer table E^4 to the shear table C′ in line with the rolling mill table; thus time is allowed for the proper cooling of the plate before it is presented to the shearing machine. In some instances, in light plates, it may not be necessary to use the transfer tables at the side, and in this case the plates can be moved directly from the rolling mill table D′ to the shear table C′, which is in line with the rolling mill table.

I claim as my invention:—

1. The combination of a rolling mill table, a shears table, a transfer table between the two, endless carriers on the transfer table for moving a plate from the rolling mill table to the shears table, and means placed between said carriers for elevating the plate while on the transfer table so that the underside of the plate can be examined, said means being independent of and normally below the carriers.

2. The combination in a transfer table, of chains arranged to travel on said table, means for driving said chains, a shaft mounted below the surface of the table, arms on the said shaft arranged to be projected through the table when the shaft is turned so as to lift a plate off the chains.

3. The combination of two parallel roller tables spaced apart, a transfer table mounted between the two roller tables, endless chains arranged to travel on the transfer table, means for driving the chains, a shaft situated below the surface of the table, arms on said shaft, heels on the arms, means for operating the shaft whereby the arms will lift the plate off the table, the heels acting as a stop for the plate and being placed so that the plate will be clear of the chains when elevated, in order that the chains can be operated while the plate is in the elevated position.

4. The combination in a transfer table, of chains arranged to travel on said table, means for driving said chains, reverse mechanism for reversing the direction of movement of the chains, a shaft mounted below the surface of the table, arms on said shaft arranged to be projected through the table when the shaft is turned so as to lift a plate off the chains.

5. In a transfer table, the combination of endless chains, means for driving said chains, reverse mechanism for reversing the direction of movement of the chains, a shaft situated below the surface of the table, arms on said shaft, heels on the arms, the mechanism being so arranged that the heel can be projected above the surface of the table after a plate has traversed over that portion of the table and on reversing the mechanism the plate can be brought against the heel, after which the arms can be raised to lift the plate off the chains.

6. The combination of two parallel roller tables situated some distance apart, each table having side frames, means for driving the rollers of the table, said means being situated along the outer frames of said tables, with a transfer table extending from one roller table to the other, said transfer table having arms projecting into the roller tables and between the rolls thereof, but stopping short of the outer frames of the table, means for raising and lowering the arms so as to bring them above the surface of the rolls or below the surface of the rolls, a driving shaft midway between the ends of the transfer table, two sets of endless roller chains on the table, one set of chains arranged to travel over one portion of the transfer table and around sprocket wheels on the driving shaft, and the other set arranged to travel over the other portion of the table and around sprocket wheels on the driving shaft, the endless chains extending above and below the inner side frames of each roller table.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

CHARLES L. HUSTON.

Witnesses:

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JOS. H. KLEIN.