

March 19, 1957

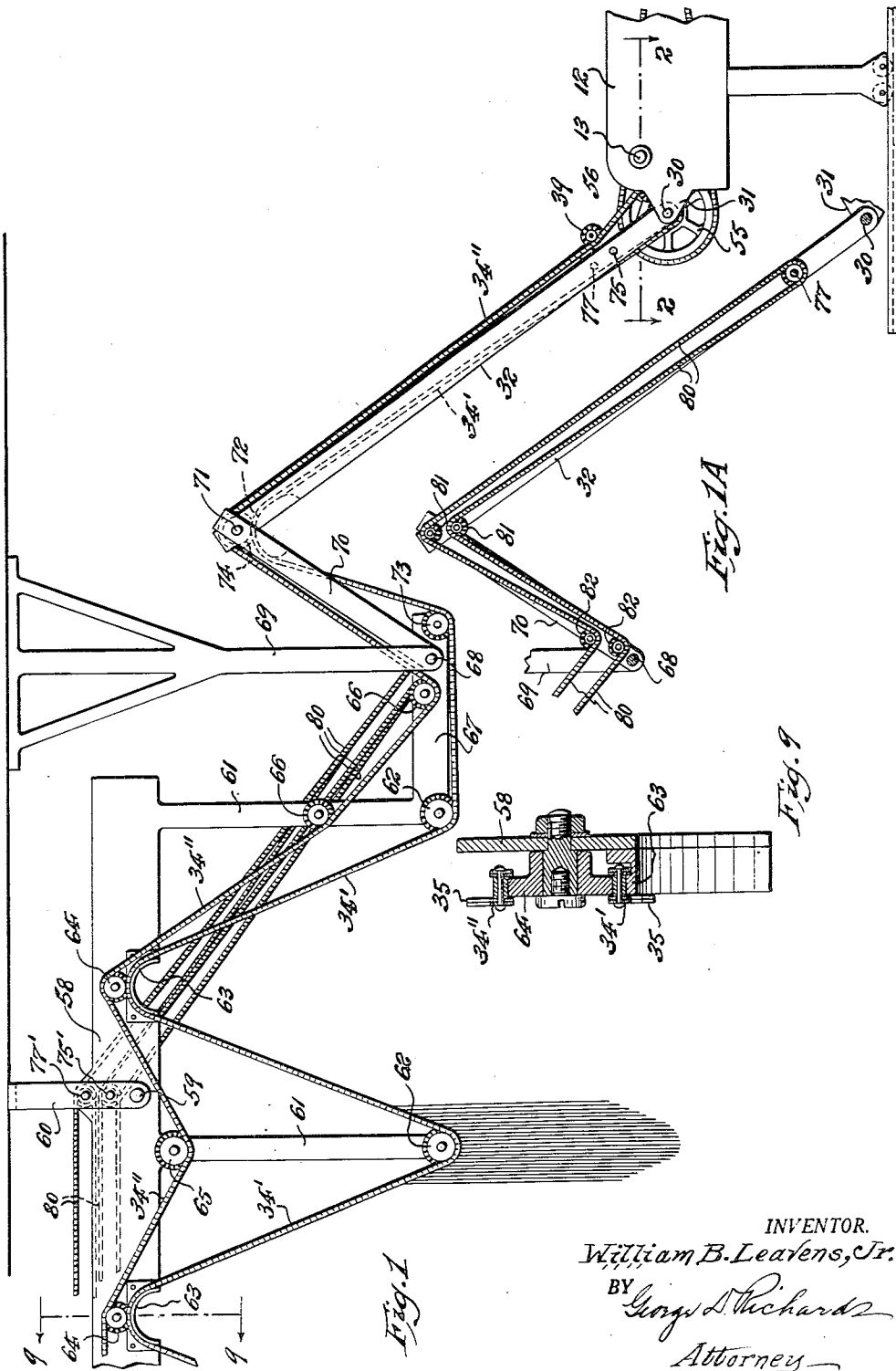
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2,785,787

DRIER APPARATUS FOR PRINTED SHEETS AND MEANS FOR LOADING SAME

Filed June 7, 1955

5 Sheets-Sheet 1



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DRIER APPARATUS FOR PRINTED SHEETS AND MEANS FOR LOADING SAME

Filed June 7, 1955

5 Sheets-Sheet 2

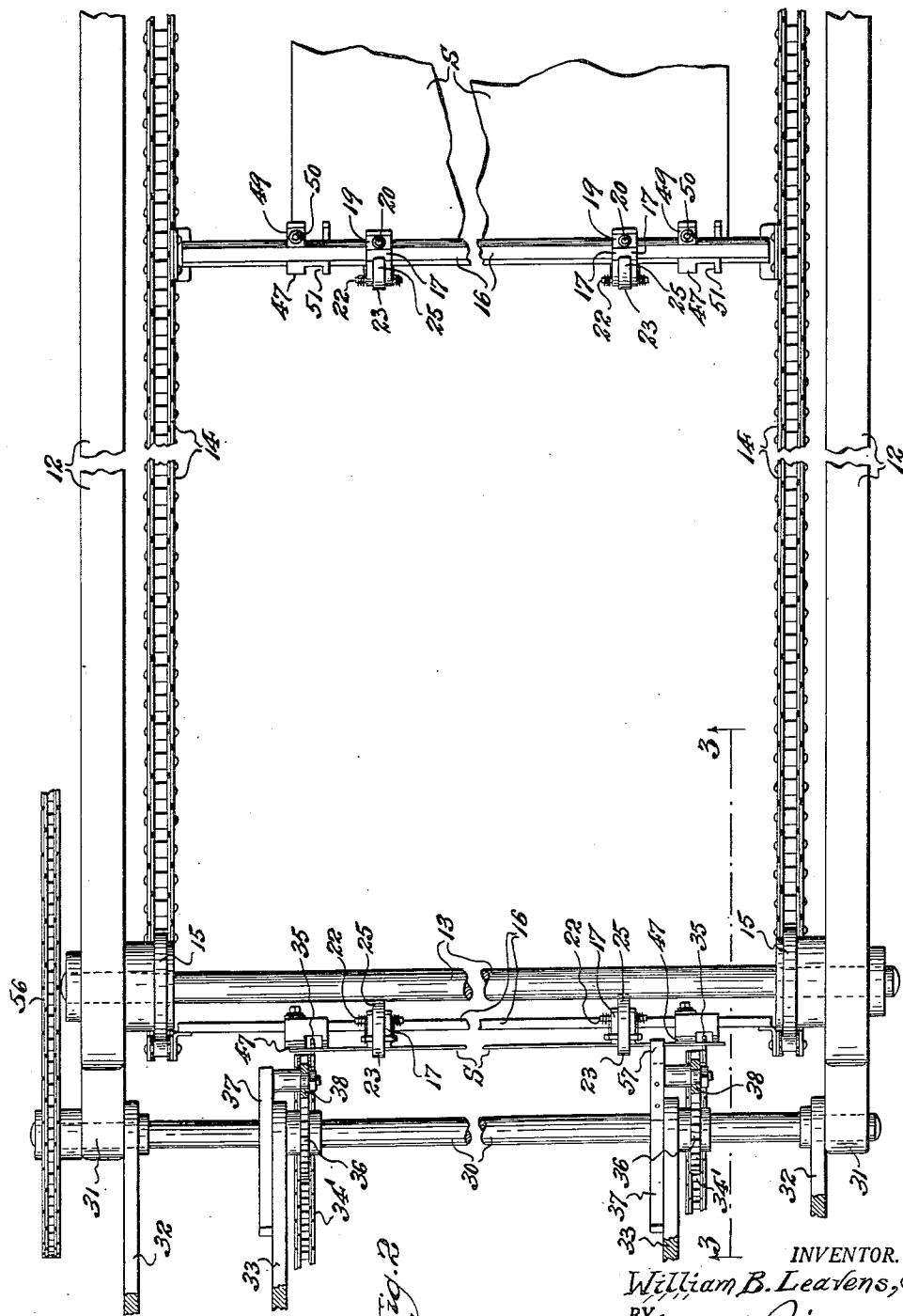


Fig. 12

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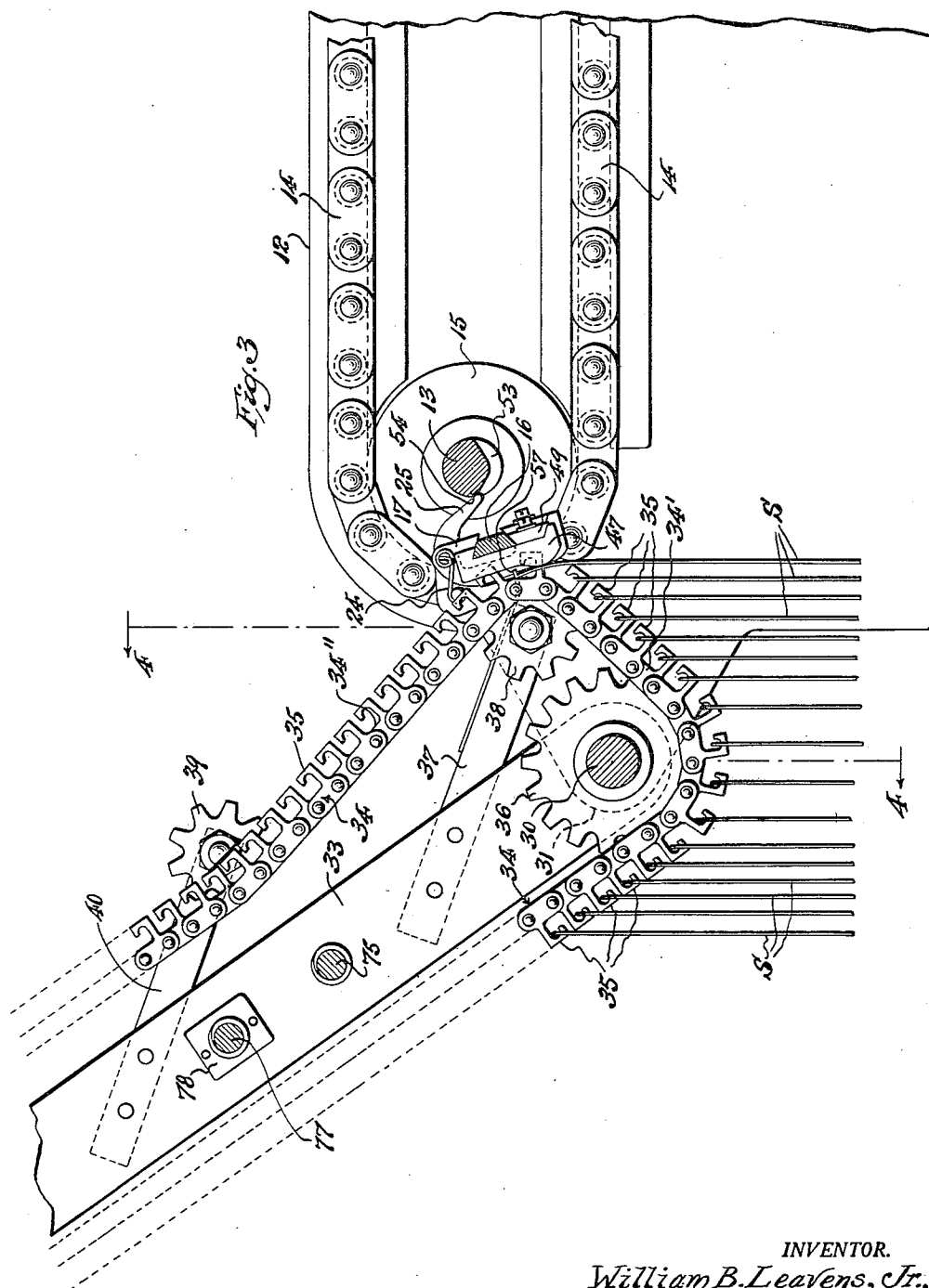
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DRIER APPARATUS FOR PRINTED SHEETS AND MEANS FOR LOADING SAME

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5 Sheets-Sheet 3



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DRIER APPARATUS FOR PRINTED SHEETS AND MEANS FOR LOADING SAME

Filed June 7, 1955

5 Sheets-Sheet 4

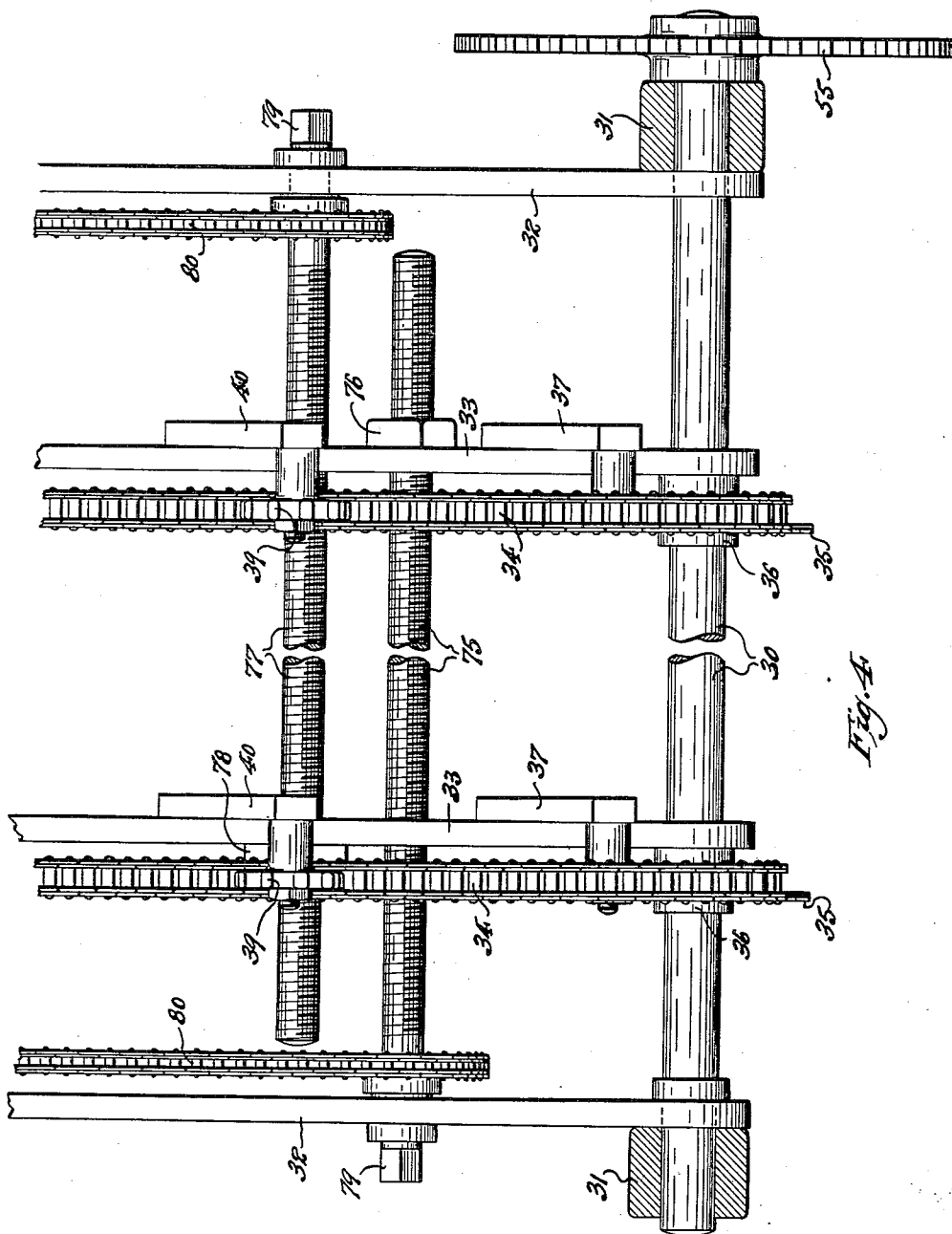


Fig. 4

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DRIER APPARATUS FOR PRINTED SHEETS AND MEANS FOR LOADING SAME

Filed June 7, 1955

5 Sheets-Sheet 5

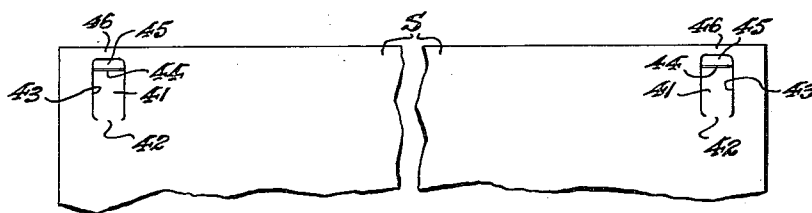


Fig. 5

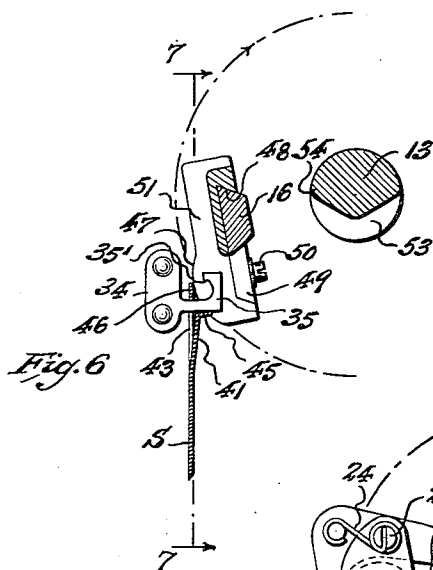


Fig. 6

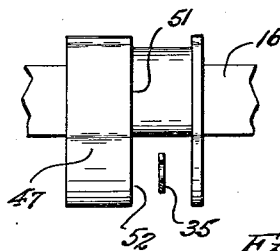


Fig. 7

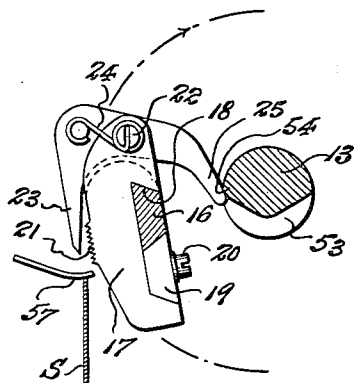


Fig. 8

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DRIER APPARATUS FOR PRINTED SHEETS AND MEANS FOR LOADING SAME

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Application June 7, 1955, Serial No. 513,873

13 Claims. (Cl. 198—102)

This invention relates to drier conveyer means adapted to receive printed sheets from the discharge mechanism of a printing press including means for automatically transferring successive discharged sheets from the latter to the former.

In the production of printed sheets it is often desirable to provide the same with a coating of varnish to overlie the printed surface, and, to such end, printing presses are in use which include means for overprinting the sheets with the varnish coating. For the reason that varnish overprinted coatings on printed sheets discharged from a printing press remain wet and tacky for an appreciable length of time, such varnish coated sheets can not be immediately piled, for immediate piling of the sheets, one upon another, would result in objectionable offset detrimental to the finish and appearance of the work. As a consequence of this, the varnished printed sheets, as discharged from the press, must be kept in separated relation, and permitted to dry or set independently for an appreciable time before they can be piled. Heretofore this has required laborious manual handling of the discharged sheets which is not practical under high speed printing conditions. When high speed discharge of varnish coated printed sheets from a press is involved, often at a rate approximating several thousand sheets an hour, the problem of automatically handling the discharged sheets, so as to hold them separated one from another while drying, becomes a serious one. This is especially so if the sheets are die cut before printing thereof, as is often done in the preparation of paper carton stock sheets cut to provide a plurality of carton blanks, since such die cut sheets are fragile, and therefore difficult to handle manually without risk of disruption.

Having the above in view, it is an object of this invention to provide a drier apparatus comprising a traveling conveyer means to receive varnish coated printed sheets as they are successively discharged from a printing press, so as to suspend said sheets in spaced apart separated relation for individual drying while being advanced by the conveyer means, and including means, connected with the sheet discharge means of the printing press, operative to automatically transfer successive sheets from said sheet discharge means to the conveyer means.

The invention has for another object to provide a drier conveyer formed by laterally spaced apart endless conveyer chains, the links of which are provided with projecting hooks to receive and suspend the sheets to be dried from the conveyer, including means to cause the hooks of the conveyer chains to diverge as they reach the loading point of the conveyer, whereby to separate hooks to be loaded from adjacent hooks, and thus to dispose the former in unimpeded sheet receiving position for cooperation with means, with which the sheet discharge means of the printing press is provided, which is operative to mount a discharged sheet on said receiving hooks, as said sheet is released by said sheet discharge means.

A further object of this invention is to provide a drier conveyer formed by laterally spaced apart endless con-

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veyer chains having sheet receiving and suspending hooks, and frame means to support and guide said chains so as to provide a major length of outgoing sheet carrying courses thereof and a minor length of return courses thereof, including means whereby movement of the return courses is transmitted to the outgoing sheet carrying courses so as to assure smooth and steady advancing movement of the latter; means being further and optionally provided for adjusting the conveyer chains and their supporting frame means toward and from one another, whereby to accommodate the lateral separation of the chains to given widths of sheets to be loaded thereon.

The invention has for a still further object to provide means for so coupling the receiving end of the drier conveyer to the sheet discharge means of a printing press, that the latter can be moved to and from separated relation to the printing press, whereby to give access to said press when desired, without disturbing the cooperative loading relation of said sheet discharge means to the drier conveyer.

The above and other objects will be understood from a reading of the following description of this invention in connection with the accompanying drawings, in which:

Fig. 1 is a schematic side elevational view of the drier apparatus and means for loading the same; and Fig. 1A is a fragmentary longitudinal sectional view at the articulated end portion of the drier conveyer which joins the same to the sheet discharge means of a printing press.

Fig. 2 is a fragmentary horizontal sectional view, taken on line 2—2 in Fig. 1, but drawn on an enlarged scale; Fig. 3 is a fragmentary vertical longitudinal sectional view, taken on line 3—3 in Fig. 2, but drawn on a further enlarged scale; and Fig. 4 is a fragmentary vertical transverse sectional view, taken on line 4—4 in Fig. 3.

Fig. 5 is a fragmentary face view of the top marginal edge portion of a sheet to be dried, as provided with means to receive conveyer chain hooks for suspension thereof on the drier conveyer.

Fig. 6 is a fragmentary cross-sectional view of means carried by the sheet discharge mechanism of a printing press which operates to thrust a sheet to be dried onto suspension hooks of the conveyer chains; and Fig. 7 is a transverse sectional view of the same, taken on line 7—7 in Fig. 6.

Fig. 8 is a fragmentary cross-sectional view of a sheet gripper element of the sheet discharge mechanism of a printing press, shown in its open position to release a discharged sheet subject to the loading application of said sheet onto suspension hooks of the conveyer chains.

Fig. 9 is a fragmentary vertical longitudinal section, taken on line 9—9 in Fig. 1, but drawn on an enlarged scale.

Like characters of reference are employed in the above described views, to indicate corresponding parts.

Referring to the drawings, the reference character 11 indicates the sheet discharge mechanism which receives a varnish coated or other printed sheet S to be dried from a printing press (not shown), and which conveys said sheet to the drier conveyer. This sheet discharge mechanism comprises a framework including laterally spaced apart side frame members 12. Affixed to and extending between outer end portions of the side frame members 12 is a stationary shaft or cross-bar 13. Mounted to respectively extend longitudinally along and adjacent to respective inner faces of the side members 12 are a pair of sprocket driven endless chains 14. At their outer ends, said chains are supported by idler rollers 15 over which they run; said idler rollers being mounted on the shaft or cross-bar 13 about which they freely rotate. Carried by the chains 14, in bridging extension therebetween, and at suitable intervals therealong, so as to move therewith, are transverse bridge bars 16. Preferably these bridge

bars 16 are of keystone shape in cross-section, with their broader width outwardly facing. Mounted on each bridge bar 16 are a plurality of sheet gripper elements, which are suitably spaced apart thereon according to a width of printed sheet issuing from the printing press; and which is to be engaged thereby so as to be advanced by the sheet discharge mechanism for delivery to the drier conveyer.

Each sheet gripper element comprises a main body 17, having in its rear side a transverse channel 18 to straddle the bridge bar 16 by which it is to be supported, and is adapted to be affixed to the latter, in a desired adjusted position along the same, by a suitably shaped clamp piece 19 which is detachably affixed thereto by a fastening bolt or screw 20, so as to engage the bridge bar 16 in clamping relation thereto (see Fig. 8). The main body 17 of the gripper element, when operatively mounted on the bridge bar 16, is disposed to extend vertically across the outer face of the latter. Said outer face portion of the main body 17 provides the stationary jaw of the gripper element, and, if desired, can be serrated, as at 21, with respect to a suitable area thereof, whereby to provide a good non-slip sheet gripping surface. Pivotaly mounted, by a pivoting cross-pin 22, in connection with the upper end of the gripper element body 17 is a movable gripper jaw 23, which is yieldably urged by spring means 24 to oppose the main body 17 in closed sheet gripping relation thereto. Said movable gripper jaw 23 is provided with a suitably shaped tail piece 25 which extends rearwardly from its pivoted end, so as to project in offset relation to the back of the gripper element main body 17. Said tail-piece 25 is adapted to be engaged by means operative, at the proper time, to move the same in direction to cause sheet releasing opening movement of the movable gripper jaw 23, as will hereinafter be more particularly explained.

The drier conveyer is connected with the outer end of the sheet discharge mechanism, and is provided with a transverse drive shaft 30 which is journaled in and between bearing bracket portions 31 that project forwardly from the ends of the side frame members 12 of said sheet discharge mechanism. Said drive shaft 30 is disposed in a plane somewhat downwardly offset from the plane of the stationary shaft or cross-bar 13 of the sheet discharge mechanism about which the bridge bars 16, and the sheet gripper elements thereon, are moved in a path concentric thereto by the driven chains 14 of said sheet discharge mechanism.

Supported at their lower ends by the drive shaft 30, respectively adjacent to the respective side frame members 12 of the sheet discharge mechanism, are upwardly and forwardly extending frame bars 32, and spaced inwardly therefrom and parallel thereto, and also supported at their lower ends by the drive shaft 30, are carrier bars 33. These frame bars 32 and carrier bars 33 form parts of a framework by which are supported a pair of parallel endless conveyer chains 34 from which sheets S to be dried are suspended and carried along while drying. Sides of successive links of the conveyer chains 34 are formed, intermediate their ends, with outwardly projecting hook formations 35 to lie in the planes thereof. Fixed on the drive shaft 30, so as to be rotated thereby, are sprockets 36 by which the conveyer chains 34 are driven. Supported by offsetting arms 37, which are respectively mounted on the respective carrier bars 33, so as to be inwardly offset from the drive sprockets 36 toward and in opposed relation to the sheet delivery end of the sheet discharge means, are relatively small idler sprockets 38 over which the return or sheet discharge mechanism approaching courses of the conveyer chains 34 pass. These sprockets 38, which for convenience of reference may be characterized as hook spreader sprockets, being positioned to angularly diverge incoming and outgoing courses of the conveyer chains relative to the loading point of the drier conveyer, and being of comparatively small size or diameter, disposes adjacent links of the conveyer chains

passing thereover in such angular relation one to another as to well separate the hooks, which are to receive a sheet S, from preceding and following hooks, so that delivery of the sheet S onto the receiving hooks is not interfered with or impeded by the latter (see Fig. 3). To further assure such divergent separation of the conveyer chain hooks, additional idler sprockets 39, spaced forwardly above said hook spreader sprockets, and supported by offsetting arms 40 which are respectively mounted on the respective carrier bars 33, can be provided, beneath which the return or approaching courses of the conveyer chains 34 pass, so as to angularly dispose the latter between the same and said hook spreader sprockets 38 (again see Fig. 3).

Although the above described arrangement which includes the hook spreader sprockets 38, in opposition to the sheet delivery end of the sheet discharge mechanism at the sheet receiving or loading point of the drier conveyer, is a desirable arrangement, nevertheless said hook spreader sprockets, in simplified arrangement, can be omitted, and the drive sprockets 36 then disposed in opposition to the sheet delivery end of the sheet discharge mechanism at the sheet receiving or loading point of the drier conveyer. In the latter case, adjacent hooks 35 of the conveyer chains 34, as they pass around the thus disposed drive sprockets 36, will be caused to sufficiently diverge in relation one to another that the hooks which are to receive a sheet S will be separated from its adjacent fellows, so that application of the sheet thereto will not be interfered with by the latter.

The chains 14 of the sheet discharge mechanism are driven from the printing press in such timed relation to the latter that a bridge bar 16, with its gripper elements, will be disposed to receive each successive printed sheet S as it issues from the press, in manner already known to the art. In operation, the lower courses of said chains 14 are the outgoing courses, and the upper courses thereof are the ingoing or return courses. The gripper engaged sheet S will be carried forward by said lower outgoing courses of the chains 14 to the delivery end of the sheet discharge mechanism, where the chains 14 pass around the supporting rollers 15 to enter upon their ingoing or return courses, at which point the gripper elements are caused to release the sheet S, subject to deposit upon the receiving hooks of the chains 34 of the drier conveyer, by means presently to be described.

To condition the sheets S for application to and suspension from the hooks 35 of the drier conveyer chains 34, the leading marginal end portion of each sheet S is provided, preferably adjacent their side margins, with yieldable cutout tongues 41 of suitable length and width, which are integrally joined at their bottom ends to the body of the sheet by narrow necks 42, that serve to hingedly connect said tongues to the latter (see Fig. 5). The cuts which separate the tongues from the body of the sheet define hook receiving openings 43 (see Fig. 6). Preferably, the free end portion of each tongue, adjacent its extremity, is provided with a transverse score 44 to form a yieldable end portion 45, which is engageable beneath a hook 35 to hold the suspended sheet firmly attached to the hook, while at the same time serving to relieve the suspending marginal portion 46 of the sheet from disrupting pressure (again see Figs. 5 and 6).

Mounted on each bridge bar 16 of the sheet discharge mechanism, to oppose a sheet in the regions of their cutout tongues 41 and the openings 43 defined thereby, are push pieces operative, at proper times, to engage and thrust the sheet toward receiving hooks of the drier conveyer chains, whereby to cause the sheet tongues 41 to yield to entrance of said receiving hooks through the hook reception openings 43. Each push piece comprises a body 47, having in its rear side a transverse channel 48 to straddle the bridge bar 16 by which it is to be carried, which body 47 is adapted to be affixed to the latter, in desired adjusted position along the same, by a suitably

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shaped clamp piece 49 that is detachably secured thereto by a fastening bolt or screw 50, whereby to engage the bridge bar in clamping relation thereto (see Fig. 6). The bodies 47 of the push pieces, when operatively mounted on a bridge bar 16, are disposed to extend vertically across the outer face of the latter. In a simple form thereof, each push piece may comprise a block-like body adapted to be so located on the bridge bar 16 as to engage, in operation, a sheet S close to one or the other side of a tongue 41 and opening 43 of the latter. Preferably, however, the front portion of the body 47 of each push piece is cut away to provide a perpendicular channel 51 of a width exceeding the width of a tongue 41 of a sheet S, so as to straddle said tongue and a receiving hook 35 of a drier conveyer chain 34; said channel 51 terminating in a downwardly open through opening 52 to provide hook clearance space (see Figs. 6 and 7). It will be obvious that such preferred form of push pieces will straddle the hooks of respective drier conveyer chains opposed thereby, so as, in operation, to bear upon and thrust against the top marginal portion of a sheet S adjacent respective sides of the tongue 41 and openings 43 thereof.

The stationary shaft or cross-bar 13, around which the bridge bars 16, with their gripper elements and push pieces pass, is cut away at its underside to provide clearance space 53 through which tail pieces 25 of the movable gripper jaws 23 of advancing gripper elements can pass without gripper opening contact with said shaft or cross-bar. Where, however, the cut away underside surface of the shaft or cross-bar 13 intersects the normal peripheral surface thereof at its forward side, a cam projection 54 is formed, which lies in the upward path of movement of said tail pieces 25 of the movable gripper jaws 23 of the gripper elements. Contact of said tail pieces with this cam portion 54 causes timed down swinging movement thereof that is operative to cause the movable gripper jaws 23 to swing open relative the stationary jaw forming main bodies 17 of the gripper elements, thereby releasing a delivered sheet S subject to transfer onto the receiving hooks of the drier conveyer chains (see Fig. 8).

The drier conveyer chains 34 are driven from the drive shaft 30 by means of a suitable speed reduction transmission operated by the printing press; and including a sprocket 55 fixed on the shaft 30 over which runs a drive chain 56. The speed at which the drier chains 34 are moved is so predetermined that successive pairs of sheet suspension hooks 35 will reach position for sheet reception synchronously with the arrival of each bridge bar 16 of the sheet discharge mechanism, with its gripper elements and push pieces, at a sheet delivery releasing position. In operation, therefore, as sheet delivering gripper elements are moved upwardly in passing relation to conveyer hooks 35, which are disposed in sheet receiving position, whereby to so position the leading end of the delivered sheet S as to oppose its tongues 41 to said hooks, said gripper elements open to release the sheet, and simultaneously the push pieces 47 engage the sheet, and by their continuing upward passing movement, exert forward thrust against the sheet, that is operative to cause the hooks to pass through the openings 43 therein. Thereafter the sheet will drop into the bights of the hooks, so as to be suspended therefrom, as the push pieces pass on. The tongues 41 of the sheet readily yield to such entering movement of the hooks through the openings 43 in the sheet (see Figs. 3 and 6). In order to assure disengagement of the sheet S from the opened gripper elements, without risk of upward over movement of the sheet beyond a position wherein its tongues 41 and openings 43 are opposed to receiving conveyer chain hooks, a sheet stop means 57 is suitably supported, for example, by at least one of the arms 37, by which the hook spreader sprockets 38 are supported, in a position to be abutted

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by the top edge of the delivered sheet, thereby arresting any upward over movement thereof (see Figs. 3 and 8). It may here be pointed out that it is preferable to provide the bill of each conveyer chain hook with an inwardly projecting tip portion 35' which overhangs the bight of the hook (see Fig. 6). These projecting tip portions guard the suspended sheets from accidental dislodgement from the hooks, as the suspended sheets are carried along by the conveyer during drying thereof.

The endless chains 34 of the drier conveyer can be arranged in various suitable ways for extension from the loading points thereof, and so as to provide a sufficient length thereof that will afford such period of drying time as will assure that the varnish coating, on the separated printed sheets S carried thereby, will attain a thoroughly dry condition, before discharge thereof from the drier conveyer.

In one arrangement of the endless conveyer chains 34 of the drier conveyer as shown (see Figs. 1 and 1A), which is adapted to provide a major length of outgoing sheet carrying courses 34' of said chains, and a minor length of return courses 34'' thereof, the laterally spaced carrier bars 33, by which the sheet receiving end of the conveyer chains are supported, are suitably connected with laterally spaced, longitudinally extending carrier frame members 58 disposed in alignment therewith. Said carriers frame members 58 are supported by transverse bars 59 which are suspended by suitable hanger members 60 dependent from the ceiling of the space through which the drier conveyer extends. These carrier frame members 58 are provided with dependent legs 61, which are longitudinally spaced therealong at suitable intervals. Mounted on the lower end portions of the legs 61 are idler sprockets 62, over which the outgoing sheet carrying conveyer chain courses 34' pass, and mounted on the main bodies of the carrier frame members 58, intermediate the legs 61 thereof, are semi-circular chain guides 63 over which said outgoing sheet carrying chain courses 34' also pass. Said guides 63 are of such width that the hook formations 35 of the links of the conveyer chains 34 freely depend exteriorly thereof as said chains pass thereover, so that the sheets suspended from the hook formations are not obstructed by said guides (see Fig. 9).

Mounted on the carrier frame members 58, above and in vertical alignment with said guides 63, are sprockets 64 which engage the outgoing courses 34' of the conveyer chains which are supported by said guides. The return courses 34'' of the conveyer chains engage said sprockets 64. Mounted on the upper portions of the legs 61 of the carrier frame members 58, intermediate and at a level below the level of said sprockets 64, are idler sprockets 65 over which the return courses 34'' of the conveyer chains pass, as the same move between the sprockets 64. Suitably disposed additional sprockets 66 are also provided to support the return courses 34'' of the conveyer chains.

The sheet carrying outgoing courses 34' of the conveyer chains are led from the supporting carrier bars 33, over idler sprockets 62 and intermediate guides 63, thus directing the same in a zig-zag path, while the return courses 34'' of the conveyer chains move, in opposite direction, back to the supporting carrier bars 33, alternately over the sprockets 64 and intervening sprockets 65 to the loading point of the drier conveyer. It will be observed that, by this arrangement, the outgoing sheet carrying courses 34' of the drier conveyer chains of major length are provided, while the return courses 34'' of the chains are of minor length. As a consequence of such arrangement, the drier conveyer will furnish a large extent of sheet carrying capacity within a minimum distance of overall conveyer length, thus conserving space required for installation of the drier conveyer. A further advantage of the above described arrangement of the drier conveyer chains is that a smooth and steady ad-

vance of the sheet loaded outgoing courses 34' of the conveyer chains is assured. This is due to the fact that the sprockets 64 are driven by the return courses 34'' of the conveyer chains in direction to impart forward driving movement to said outgoing courses 34' which are engaged by said sprockets 64 as they pass over the guides 63, thus avoiding any tendency of snubbing drag upon the chains as they pass over said guides 63.

In some types of printing presses it is desirable that the sheet discharge mechanism be withdrawn outwardly away from the printed sheet discharge end of the press, whereby to give access to the press. Such separating movement of the sheet discharge mechanism is necessarily toward the drier conveyer, and consequently means is required to permit the latter to yield to such separating movement of the sheet discharge mechanism, without, however, disturbing the operative sheet receiving or loading relation of the drier conveyer to the latter. To provide a yieldable connection of the drier conveyer with the sheet discharge mechanism, an articulate coupling of the frame bars 32 with conveyer supporting means can be arranged. In an illustrative arrangement to such end as shown, the innermost legs 61 of the carrier frame members 58 are provided with angular frame extensions 67 that are supported by a transverse bar 68 suspended by additional hanger members 69. Auxiliary frame bars 70 are pivotally connected by their upper ends with a transverse bar 71, which extends through the upper ends of the frame bars 32 and carrier bars 33, and to which these bars are pivotally connected. The lower ends of said auxiliary frame bars 70 are pivotally connected with said transverse bar 68 which is supported by the suspending hanger members 69. As thus arranged, the frame bars 32 and auxiliary frame bars 70 provide an articulated connection of the drier conveyer with the sheet discharge mechanism of the press, the same being capable of expansion and contraction as the latter is moved toward and from the press. To support the conveyer chains in connection with the articulated portions of the conveyer frame structure (see Fig. 1), the outgoing courses 34' of the conveyer chains extend from the drive sprockets 36 upwardly along the carrier bars 33 to pass over curved guides 72 (similar to the above described guides 63), which are affixed to the upper end portions of said carrier bars, and thence downwardly to and over idler sprockets 73, which are mounted on the frame extensions 67, from which they pass to and over the idler sprockets 62 of the legs 61 by which said frame extensions 67 are carried. The return courses 34'' of the conveyer chains pass upwardly from sprockets 66 and over sprockets 74, which are mounted on the upper end portions of the carrier bars 33, above and in vertically aligned relation to the guides 72, and thence downwardly along said carrier bars 33 back to the drive sprockets 36. The sprockets 74 engage the outgoing courses 34' of the conveyer chains with driving effect thereupon.

Since the width of printed sheets produced by the printing press may vary from job to job, it is desirable to provide means whereby the lateral spacing of drier conveyer chains may be adjusted to accommodate various widths of printed sheets. To provide for this, the carrier bars 32 and carrier frame members 58 are laterally slidable toward and from one another on the shaft 30 and transverse bars 71, 68 and 59 by which these parts of the conveyer frame structure are supported. The means for effecting such adjustments comprises a transverse screw-threaded shaft 75, which is journaled in one frame bar 32, and which is adapted to engage through a nut 76 with which one carrier bar 33 is provided; and another transverse screw-threaded shaft 77, which is journaled in the other frame bar 32, and which is adapted to engage through a nut 78, with which the other carrier bar 33 is provided (see Fig. 4). Corresponding screw-threaded shafts 75' and 77' are journaled in hanger members 60,

or elsewhere as may be desirable to correspondingly engage and move respective hanger frame members 58, or other parts. External ends of the screw-threaded shafts 75 and 77 are utilized for effecting turning movements of said shafts in desired directions by application thereto of a crank handle (not shown), to receive which the shafts can be provided with square ends 79. The turning of respective screw-threaded shafts 75 and 77 actuates respective chain and sprocket transmission means 80 for communicating like turning movements to all corresponding screw-threaded shafts 75' and 77', so that the carrier frame members 58 are simultaneously adjusted in company with adjustment of the carrier bars 33. If the articulated coupling structure is utilized to yieldably join the drier conveyer to a movable sheet discharge mechanism of the printing press, chains of the sections of the chain and sprocket means 80 are supported in connection with said coupling structure by idler sprockets 81 mounted on the frame bars 32, and idler sprockets 82 mounted on the auxiliary frame bars 70, so that contracting and expanding movements of said coupling structure are not interfered with by said chains (see Fig. 1A).

The discharge end of the drier conveyer is not shown, but it will be understood that as the conveyer chains 34, on arrival at said discharge end, change or reverse their outgoing courses to return courses, the sheet suspending hook formations 35 will be reversed or inverted so that the dry suspended sheets readily drop away therefrom, or can be otherwise detached therefrom, for deposit upon suitable collecting or piling means.

It will be understood that this invention is not limited to details of the illustrative apparatus shown and described, since these may be variously modified, and, furthermore, it is not indispensable that all features of the invention be used conjointly since various features may be used to advantage in different combinations and sub-combinations within the scope of the herefollowing claims.

Having now described my invention, I claim:

1. In combination with mechanism for discharging printed sheets from a printing press, leading marginal portions of the sheets having laterally spaced suspension hook receiving openings therein, a drier apparatus opposed to the sheet discharge mechanism for reception of sheets therefrom, said drier apparatus comprising laterally spaced endless conveyer chains, a framework having means to support said conveyer chains for operative circulatory movement, means to drive said conveyer chains, links of said conveyer chains having outwardly projecting hooks to receive sheets for suspension thereby, the sheet discharge mechanism having sheet gripper devices for successively advancing sheets to the drier apparatus, means to open said gripper devices to release sheets for transfer to the drier apparatus, and said sheet discharge mechanism also having push pieces operative to engage and thrust released sheets onto conveyer chain hooks at points where movement of outgoing courses of the conveyer chains begins.

2. In combination with mechanism for discharging printed sheets from a printing press, leading marginal portions of the sheets having laterally spaced suspension hook receiving openings therein, a drier apparatus opposed to the sheet discharge mechanism for reception of sheets therefrom, said drier apparatus comprising laterally spaced endless conveyer chains, a framework having means to support said conveyer chains for operative circulatory movement, means to drive said conveyer chains, links of said conveyer chains having outwardly projecting hooks to receive sheets for suspension thereby, said sheet discharge mechanism comprising laterally spaced driven chains having successive bridge bars carried thereby in extension therebetween, a stationary cam bar adjacent the sheet delivery end of the discharge mechanism, chain supporting means concentric to said cam bar around which said chains and bridge bars pass, sheet gripper devices

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mounted on respective bridge bars for successively advancing sheets to the drier apparatus, said gripping devices having means engageable by said cam bar for opening the same to release sheets for transfer to the drier apparatus, and push pieces also mounted on respective bridge bars operative to engage released sheets adjacent their hook receiving openings and thereupon thrust the same over and onto conveyer chain hooks at points where movement of outgoing courses of the conveyer chains begins.

3. In combination with apparatus for drying printed sheets issuing from a printing press of mechanism for discharging the sheets from the press to said drier apparatus, leading marginal portions of the sheets having laterally spaced suspension hook receiving openings therein, said drier apparatus comprising laterally spaced endless conveyer chains the links of which are provided with outwardly projecting hooks to receive sheets for suspension thereby, means to continuously drive said conveyer chains, hook by hook, in coordinated relation to successive sheet delivery operation of said sheet discharge mechanism, a framework having means to support said conveyer chains for operative circulatory movement including sprocket means around which inner end portions of the conveyer chains pass from their return courses to their outgoing courses, movement of the conveyer chain links around said sprocket means being adapted to cause their hooks to diverge, whereby to separate sheet receiving hooks from preceding and following hooks adjacent thereto at points where movement of the outgoing courses of the conveyer chains begins, the sheet discharge mechanism having sheet gripper devices for successively advancing sheets to the drier apparatus, means to open said gripper devices as they pass sheet receiving hooks so as to release the sheet advanced thereby for transfer to the latter, and said sheet discharge mechanism also having push pieces operative to engage and thrust released sheets onto said receiving hooks.

4. The combination according to claim 3 further including means to adjust the supported conveyer chains of the drier apparatus toward and from one another according to width of sheets to be carried thereby.

5. In combination with apparatus for drying sheets issuing from a printing press of mechanism for discharging the sheets from the press and carrying the same to said drier apparatus, leading marginal portions of the sheets having laterally spaced suspension hook receiving openings therein, said drier apparatus comprising laterally spaced endless conveyer chains the links of which are provided with outwardly projecting hooks to receive sheets for suspension thereby, means to continuously drive said conveyer chains hook by hook in coordinated relation to successive sheet delivery operation of said sheet discharge mechanism, a framework having means to support said conveyer chains for operative circulatory movement including sprocket means around which inner end portions of the conveyer chains pass from their return courses to their outgoing courses, movement of the conveyer chain links around said sprocket means being adapted to cause their hooks to diverge, whereby to separate sheet receiving hooks from preceding and following hooks adjacent thereto at points where movement of the outgoing courses of the conveyer chains begins, said sheet discharge mechanism comprising laterally spaced driven chains having successive bridge bars carried thereby in extension therebetween, a stationary cam bar adjacent the sheet delivery end of the discharge mechanism, chain supporting means concentric to said cam bar around which said chains and bridge bars pass, sheet gripper devices mounted on respective bridge bars for successively advancing sheets to the drier apparatus, said gripper devices having means engageable by said cam bar operative to open said devices as they pass sheet receiving hooks so as to release the sheet advanced thereby for transfer to the latter, and push pieces also mounted on respective bridge bars operative to engage released sheets adjacent

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their hook receiving openings and thereupon thrust the same over and onto said receiving hooks.

6. The combination according to claim 5 further including means to adjust the supported conveyer chains of the drier apparatus toward and from one another according to width of sheets to be carried thereby, and means to adjustably secure said gripper devices and said push pieces to respective bridge bars of the sheet discharge mechanism according to width of sheets operated upon.

7. The combination according to claim 5, wherein the framework which supports said conveyer chains is provided with means to guide the outgoing courses of said conveyer chains in a zig-zag path of major length and with means to guide the return courses of said conveyer chains in a path of comparatively minor length, and said latter guide means including sprockets driven by said return courses, said sprockets meshing with said outgoing courses in driving relation thereto.

8. The combination according to claim 7 further including means to adjust the supported conveyer chains of the drier apparatus toward and from one another according to width of sheets to be carried thereby, and means to adjustably secure said gripper devices and said push pieces to respective bridge bars of the sheet discharge mechanism according to width of sheets operated upon.

9. The combination of apparatus for drying printed sheets issuing from a printing press with mechanism for discharging the sheets from the press to the drier apparatus, said sheet discharge mechanism being movable between the press and the drier apparatus, said drier apparatus comprising laterally spaced endless conveyer chains the links of which are provided with outwardly projecting hooks to receive sheets for suspension thereby, means for driving said conveyer chains including a drive shaft journaled across the delivery end of the sheet discharge mechanism, a stationary framework, articulated frame bars pivotally interconnected between said drive-shaft and said stationary framework, whereby to provide a yieldable coupling between the drier apparatus and the sheet discharge mechanism, said stationary framework and articulated frame bars having means to support the conveyer chains for operative circulatory movement including sprocket means around which inner end portions of the conveyer chains pass from their return courses to their outgoing courses, movement of the conveyer chain links around said sprocket means being adapted to cause their hooks to diverge, whereby to separate sheet receiving hooks from preceding and following hooks adjacent thereto at points where movement of the outgoing courses of the conveyer chains begins, the sheet discharge mechanism having sheet gripper devices for successively advancing sheets to the drier apparatus, means to open said gripper devices as they pass sheet receiving hooks so as to release the sheet advanced thereby for transfer to the latter, and said sheet discharge mechanism also having push pieces operative to engage and thrust released sheets onto said receiving hooks.

10. The combination according to claim 9, further including means to adjust the supported conveyer chains of the drier apparatus toward and from one another according to widths of sheets to be carried thereby.

11. The combination of apparatus for drying printed sheets issuing from a printing press with mechanism for discharging the sheets from the press to the drier apparatus, said sheet discharge mechanism being movable between the press and the drier apparatus, said drier apparatus comprising laterally spaced endless conveyer chains the links of which are provided with outwardly projecting hooks to receive sheets for suspension thereby, means for driving said conveyer chains including a drive shaft journaled across the delivery end of the sheet discharge mechanism, a stationary framework, articulated frame bars pivotally interconnected between said drive shaft and said stationary framework, whereby to provide

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a yieldable coupling between the drier apparatus and the sheet discharge mechanism, said stationary framework and articulated frame bars having means to support the conveyer chains for operative circulatory movement including sprocket means around which inner end portions of the conveyer chains pass from their return courses to their outgoing courses, movement of the conveyer chain links around said sprocket means being adapted to cause their hooks to diverge, whereby to separate sheet receiving hooks from preceding and following hooks adjacent thereto at points where movement of the outgoing courses of the conveyer chains begins, said sheet discharge mechanism comprising laterally spaced driven chains having successive bridge bars carried thereby in extension therebetween, a stationary cam bar adjacent the sheet delivery end of the discharge mechanism, chain supporting means concentric to said cam bar around which said chains and bridge bars pass, sheet gripper devices mounted on respective bridge bars for successively advancing sheets to the drier apparatus, said gripper devices having means engageable by said cam bar operative to open said devices as they pass sheet receiving hooks so as to release the sheet advanced thereby for transfer to the latter, and push pieces also mounted on respective bridge bars operative to engage released sheets and thereupon thrust openings, with which leading marginal end portions thereof are provided, over said receiving hooks whereby to suspend the sheet from said hooks.

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12. The combination according to claim 11 further including means to adjust the supported conveyer chains of the drier apparatus toward and from one another according to width of sheets to be carried thereby, and means to adjustably secure said gripper devices and push pieces to respective bridge bars of the sheet discharge mechanism according to width of sheets operated upon.

13. In combination with a printing press having mechanism for discharging printed sheets therefrom, said sheet discharging mechanism comprising endless chain carried sheet grippers, a drier apparatus comprising supported endless conveyer chains the links of which are provided with outwardly projecting sheet receiving and suspending hooks, means to drive said conveyer chains in timed relation to operative movement of said grippers of the sheet discharging mechanism so that hooks of said conveyer chains are successively opposed to the latter in sheet receiving relation thereto, and means to cause said grippers to release the sheets and thereupon force the same over the rights of opposing hooks of said conveyer chains.

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